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Using the BayStack 410-24T 10BASE-T Switch

NORTEL NETWORKS™

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Chapter 1 Preface

Congratulations on your purchase of the BayStack™ 410-24T 10BASE-T Switch, part of the Nortel Networks™ BayStack Switch line of communications products.

This guide describes the features, uses, and installation procedures for the BayStack 410-24T 10BASE-T Switch (also referred to in this guide as the "BayStack 410-24T switch" or the "switch").

BayStack 410-24T switches include a dedicated Uplink Module slot for attaching optional media dependent adapters (MDAs) that support a range of media types. Installation instructions are included with each MDA (see your Nortel Networks sales representative for ordering information).

For more information about the MDAs, refer to Appendix B, "Media Dependent Adapters."

BayStack 410-24T switches provide Fail-Safe stackability when you install the optional BayStack 400-ST1 Cascade Module. Installation instructions are included with each BayStack 400-ST1 Cascade Module (see your Nortel Networks sales representative for ordering information).

For more information about the BayStack 400-ST1 Cascade Module, see "Stack Operation" on page 1-23.

Before You Begin

This guide is intended for network installers and system administrators who are responsible for installing, configuring, or maintaining networks. This guide assumes that you understand the transmission and management protocols used on your network.

Organization

This guide has four chapters, six appendixes, and an index:

If you want to:	Go to:
Learn about the BayStack 410-24T switch and its key features	Chapter 1
Install the BayStack 410-24T switch on a flat surface or in a 19-inch equipment rack, and verify its operation	Chapter 2
Connect to the BayStack 410-24T switch Console/Comm Port and learn how to use the console interface (CI) menus to configure and manage a standalone switch or a stack configuration	Chapter 3
Troubleshoot and diagnose problems with the BayStack 410-24T switch	Chapter 4
View operational and environmental specifications that apply to the BayStack 410-24T switch	Appendix A
Learn about optional media dependent adapters (MDAs) you can use with the BayStack 410-24T switch	Appendix B
Learn about Quick-Step flowcharts for using the BayStack 410-24T switch features	Appendix C
Learn more about the BayStack 410-24T switch connectors (ports) and pin assignments	Appendix D
View a listing of the factory default settings for the BayStack 410-24T switch	Appendix E
View a sample BootP configuration file	Appendix F
View an alphabetical listing of the topics and subtopics in this guide, with cross-references to relevant information	Index

Text Conventions

This guide uses the following text conventions:

bold text	Indicates command names and options and text that you need to enter. Example: Enter **show ip** {**alerts** | **routes**}. Example: Use the **dinfo** command.
italic text	Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is: **show at** <*valid_route*> *valid_route* is one variable and you substitute one value for it.
`screen text`	Indicates system output, for example, prompts and system messages. Example: `Set Trap Monitor Filters`
[Enter]	Named keys in text are enclosed in square brackets. The notation [Enter] is used for the Enter key and the Return key.
[Ctrl]-C	Two or more keys that must be pressed simultaneously are shown in text linked with a hyphen (-) sign.

Acronyms

This guide uses the following acronyms:

AUI	attachment unit interface
BootP	Bootstrap Protocol
BPDU	Bridge Protocol Data Unit
CI	console interface
CRC	cyclic redundancy check
CSMA/CD	carrier sense multiple access/collision detection
CTS	clear to send
DCE	data communications equipment
DSR	data set ready
DTE	data terminal equipment
ECM	Entity Coordination Management
FID	filtering database identifier
HRPSU	high-power redundant power supply unit
IGMP	Internet Gateway Management Protocol
IP	Internet Protocol
ISO	International Organization for Standardization
LED	light emitting diode
MAC	media access control
MAU	media access unit
MDA	media dependent adapter
MDI	medium dependent interface
MDI-X	medium dependent interface-crossover
MIB	Management Information Base
NIC	network interface controller
NMS	network management station

(continued)

PID	Protocol Identifier
PPP	Point-to-Point Protocol
PVID	port VLAN identifier
RARP	Reverse Address Resolution Protocol
RMON	remote monitoring
RPSU	redundant power supply unit
SNMP	Simple Network Management Protocol
STA	Spanning Tree Algorithm
STP	Spanning Tree Protocol
TELNET	Network Virtual Terminal Protocol
TFTP	Trivial File Transfer Protocol
UTP	unshielded twisted pair
VID	VLAN identifier
VLAN	virtual local area network

Related Publications

For more information about using the BayStack 410-24T switch, refer to the following publications:

- *Installing Media Dependent Adapters (MDA)s* (Part number 302403-B)

  Describes how to install optional media dependent adapters to your BayStack 410-24T switch.

- *Installing the BayStack 400-ST1 Cascade Module* (Part number 304433-A)

  Describes how to connect up to eight BayStack 410-24T switches into a stack configuration by installing optional BayStack 400-ST1 Cascade Modules.

- *Reference for the BayStack 350/410/450 Management Software Operations* (Part number 304935-B)

  Describes how to use the Nortel Networks Device Manager software, a set of graphical network management applications you can use to configure and manage the BayStack 350/410/450 switches.

You can print selected technical manuals and release notes free, directly from the Internet. Go to *support.baynetworks.com/library/tpubs/*. Find the product for which you need documentation. Then locate the specific category and model or version for your hardware or software product. Using Adobe Acrobat Reader, you can open the manuals and release notes, search for the sections you need, and print them on most standard printers.

You can download Acrobat Reader free from the Adobe Systems Web site, *www.adobe.com*.

You can purchase selected documentation sets, CDs, and technical publications through the collateral catalog. The catalog is located on the World Wide Web at *support.baynetworks.com/catalog.html* and is divided into sections arranged alphabetically:

- The “CD ROMs” section lists available CDs.
- The “Guides/Books” section lists books on technical topics.
- The “Technical Manuals” section lists available printed documentation sets.

How to Get Help

If you purchased a service contract for your Nortel Networks product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Nortel Networks service program, contact one of the following Nortel Networks Technical Solutions Centers:

Technical Solutions Center	Telephone Number
Billerica, MA	800-2LANWAN (800-252-6926)
Santa Clara, CA	800-2LANWAN (800-252-6926)
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5402-7041

Chapter 1
Introduction to the BayStack 410-24T Switch

This chapter introduces the BayStack 410-24T switch and covers the following topics:

- Physical description
- Summary of features
- Network configuration examples
- Overview of main features

Physical Description

The BayStack 410-24T switch (see Figure 1-1) provides high-performance, low-cost full-duplex and half-duplex connections to 10BASE-T local area networks (LANs). With the addition of (optional) media dependent adapters (MDAs), the BayStack 410-24T switch can support high-speed connections to servers, shared fast Ethernet hubs, or backbone devices.

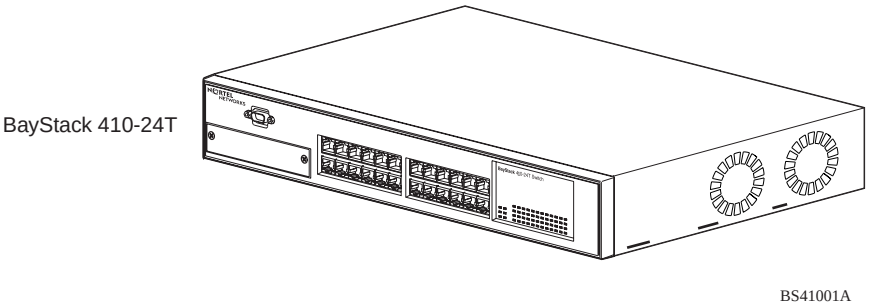
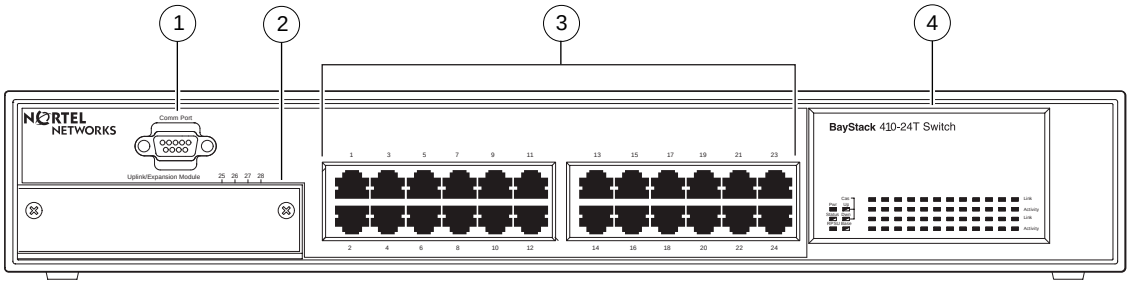


Figure 1-1. BayStack 410-24T Switch

Front Panel

Figure 1-2 shows the BayStack 410-24T switch front panel. Descriptions of the front panel components follow the figure.

For a description of the components located on the back panel of the BayStack 410-24T switch, see "Back Panel" on page 1-6.



BayStack 410-24T

1 = Comm Port
2 = Uplink/Expansion slot
3 = 10BASE-T port connectors
4 = LED display panel

BS41002A

Figure 1-2. BayStack 410-24T Switch Front Panel

Comm Port

The Comm Port (also referred to as the Console/Comm Port) allows you to access the console interface (CI) screens and customize your network using the supplied menus and screens (see Chapter 3, "Using the Console Interface").

The Console/Comm Port is a DB-9, RS-232-D male serial port connector. You can use this connector to connect a management station or console/terminal to the switch by using a straight-through DB-9 to DB-9 standard serial port cable (see "Console/Comm Port" on page 2-10).

Note: The Console/Comm Port is configured as a data communications equipment (DCE) connector. Ensure that your RS-232 cable pinouts are configured for DCE connections (see "DB-9 (RS-232-D) Console/Comm Port Connector" on page D-5).

The console port default settings are: 9600 baud with eight data bits, one stop bit, and no parity as the communications format, with flow control set to disabled.

Uplink/Expansion Slot

The Uplink/Expansion slot allows you to attach optional media dependent adapters (MDAs) that support a range of media types (see Appendix B, "Media Dependent Adapters" for more information about MDA types available from Nortel Networks).

10BASE-T Port Connectors

The BayStack 410-24T switch uses 10BASE-T (8-pin modular) port connectors.

All BayStack 410-24T switches are shipped with port connectors configured as MDI-X (media-dependent interface-crossover). These ports connect over straight cables to the network interface controller (NIC) card in a node or server, similar to a conventional Ethernet repeater hub. If you are connecting to another Ethernet hub or Ethernet switch, you need a crossover cable unless an MDI connection exists on the associated port of the attached device (see "MDI and MDI-X Devices" on page D-2).

The switch ports also support half- and full-duplex mode operation (see also "Connecting the 10BASE-T Ports" on page 2-8).

The switch uses RJ-45 port connectors to connect to 10BASE-T Ethernet segments or nodes.

Note: 10BASE-T/100BASE-TX MDA ports (optional) must use Category 5 UTP cable to accommodate the 100BASE-TX functionality.

See Appendix D, "Connectors and Pin Assignments" for more information about the RJ-45 port connectors.

LED Display Panel

Figure 1-3 shows the LED display panels used with the BayStack 410-24T switch.

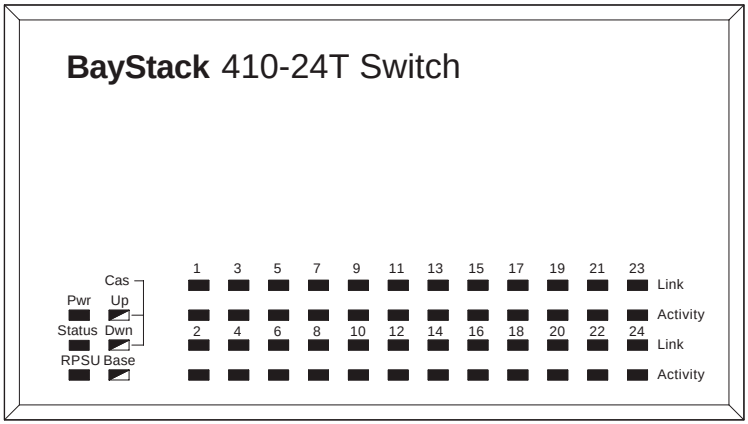


Figure 1-3. BayStack 410-24T Switch LED Display Panel

Table 1-1 provides descriptions of the LEDs.

Table 1-1. BayStack 410-24T Switch LED Descriptions

Label	Type	Color	State	Meaning
Pwr	Power status	Green	On	DC power is available to the switch's internal circuitry.
			Off	No AC power to switch, or power supply failed.
Status	System status	Green	On	Self-test passed successfully and switch is operational.
			Blinking	A nonfatal error occurred during the self-test.
			Off	The switch failed the self-test.
RPSU	RPSU status	Green	On	The switch is connected to the HRPSU and can receive power if needed.
			Off	The switch is not connected to the HRPSU or HRPSU is not supplying power.

(continued)

Table 1-1. BayStack 410-24T Switch LED Descriptions *(continued)*

Label	Type	Color	State	Meaning
CAS Up	Stack mode		Off	The switch is in standalone mode.
		Green	On	The switch is connected to the *upstream* unit's Cascade A In connector.
		Amber	On	The Cascade A Out connector (CAS Up) for this switch is looped internally (wrapped to the secondary ring).
		Amber or Green	Blinking	Incompatible software revision or unable to obtain a unit ID (Renumber Stack Unit table full). The unit is on the ring but cannot participate in the stack configuration.
CAS Dwn	Stack mode		Off	The switch is in standalone mode.
		Green	On	The switch is connected to the *downstream* unit's Cascade A Out connector.
		Amber	On	The Cascade A In connector (CAS Dwn) for this switch is looped internally (wrapped to the secondary ring).
		Amber or Green	Blinking	Incompatible software revision or unable to obtain a unit ID (Renumber Stack Unit table full). The unit is on the ring but cannot participate in the stack configuration.
Base	Base mode	Green	On	The switch is configured as the stack base unit.
			Off	The switch is *not* configured as the stack base unit (or is in standalone mode).
			Blinking	Stack configuration error: Indicates that *multiple* base units or *no* base units are configured in the stack.
		Amber	On	This unit is operating as the stack configuration's *temporary base unit*. This condition occurs automatically if the base unit (directly downstream from this unit) fails. If this happens, the following events take place: • The two units directly upstream and directly downstream from the failed unit automatically wrap their cascade connectors and indicate this condition by lighting their Cas Up and Cas Dwn LEDs (see Cas Up and Cas Dwn description in this table). • If the temporary base unit fails, the next unit directly downstream from this unit becomes the new temporary base unit. This process can continue until there are only two units left in the stack configuration.

(continued)

Table 1-1. BayStack 410-24T Switch LED Descriptions *(continued)*

Label	Type	Color	State	Meaning
				This automatic process is a temporary safeguard only. If the stack configuration loses power, the temporary base unit will not power up as the base unit when power is restored. For this reason, you should always assign the temporary base unit as the base unit (set the Unit Select switch to Base) until the failed unit is repaired or replaced.
Link	10 Mb/s port speed indicator	Green	On	The corresponding port is set to operate at 10 Mb/s and the link is good.
		Green	Blinking	The corresponding port has been disabled by software.
			Off	The link connection is bad or there is no connection to this port.
Activity	Port activity	Green	Blinking	Indicates network activity for the corresponding port. A high level of network activity can cause the LEDs to appear to be on continuously.

Back Panel

This section describes the BayStack 410-24T switch back panel components (Figure 1-4).

Descriptions of the back panel components follow the figure.

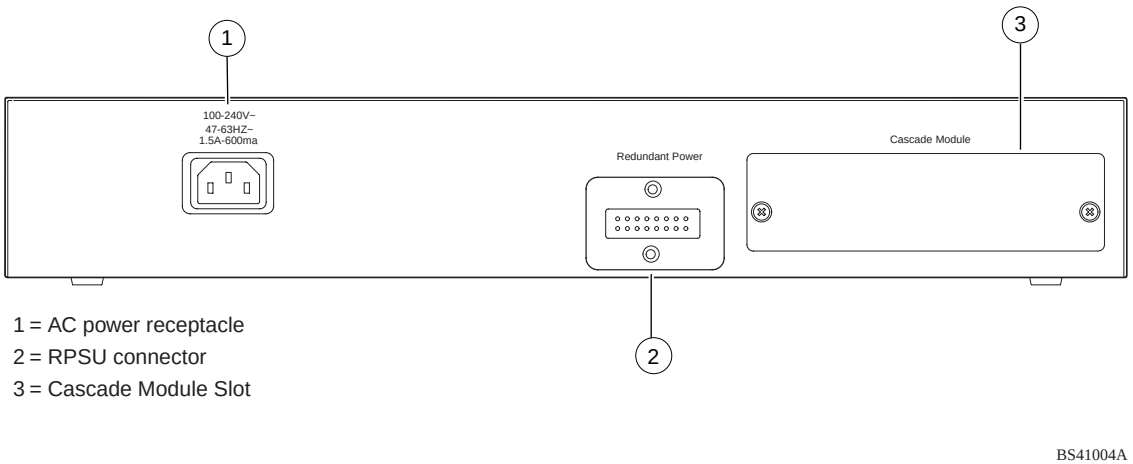


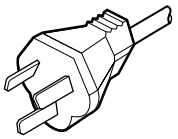
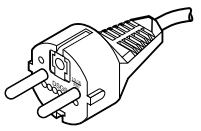
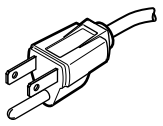
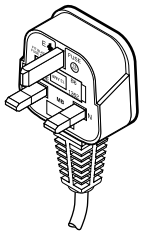
Figure 1-4. BayStack 410-24T Switch Back Panel

AC Power Receptacle

The AC power receptacle accepts the AC power cord (supplied). For installation outside of North America, make sure that you have the proper power cord for your region. Any cord used must have a CEE-22 standard V female connector on one end and must meet the IEC 320-030 specifications.

Table 1-2 lists specifications for international power cords.

Table 1-2. International Power Cord Specifications

Country/Plug description	Specifications	Typical plug
Australia: • AS3112-1981 Male plug	240 VAC 50 Hz Single phase	 230FA
Continental Europe: • CEE7 standard VII male plug • Harmonized cord (HAR marking on the outside of the cord jacket to comply with the CENELEC Harmonized Document HD-21)	220 or 230 VAC 50 Hz Single phase	 228FA
U.S./Canada/Japan: • NEMA5-15P male plug • UL recognized (UL stamped on cord jacket) • CSA certified (CSA label secured to the cord)	100 or 120 VAC 50–60 Hz Single phase	 227FA
United Kingdom: • BS1363 male plug with fuse • Harmonized cord	240 VAC 50 Hz Single phase	 229FA

RPSU Connector

The RPSU connector allows you to connect a backup power supply unit to the switch. Nortel Networks provides an (optional) high-power redundant power supply unit (HRPSU) for this purpose. The HRPSU is a hot-swappable power supply unit that provides uninterrupted operation to up to four BayStack 410-24T switches in the event that any of the switch power supplies fail.

Nortel Networks provides the HRPSU power rack (Order No. AA0002001) with four slots for power supply modules (Order No. AA0005003). Each HRPSU can support up to four BayStack 410-24T switches. Installation instructions are provided with the HRPSU.

Contact your Nortel Networks sales representative for more information about the HRPSU.

Cascade Module Slot

The Cascade Module slot allows you to attach an optional BayStack 400-ST1 Cascade Module to the switch (see "Stack Operation" on page 1-23).

You can connect up to eight BayStack 410-24T switches into a redundant stack configuration. BayStack 410-24T switches use a fail-safe cascade stacking architecture which, in the unlikely event of a switch failure, maintains the integrity of the remaining stack: all signals are looped back at the point of failure. Because each unit in the stack has a full copy of the stack configuration, operation of the stack continues without affecting application connectivity.

Any mix of up to eight BayStack 410-24T switches and BayStack 450 switches can be stacked to provide a total of 224 ports (when all MDA slots are configured with the maximum port availability).

Installation instructions are provided with each BayStack 400-ST1 Cascade Module (see *Installing the BayStack 400-ST1 Cascade Module*). See your Nortel Networks sales representative for ordering information.

Cooling Fans

The variable-speed cooling fans (not shown) are located on one side of the switch to provide cooling for the internal components. When you install the switch, be sure to allow enough space on *both sides* of the switch for adequate air flow.

Features

BayStack 410-24T switches offer the following features:

- High-speed forwarding rate: Up to 1 million packets per second (peak)
- Store-and-forward switch: Full-performance forwarding at full line speed, utilizing a 1.28 Gigabit/second switch fabric
- Learning rate: 1 million addresses per second (peak)
- Address database size: 16,000 entries at line rate (32,000 entries without flooding)
- Fail-safe stacking: Provides uninterrupted connectivity for up to eight units, with up to 224 ports stacked together as one managed unit (requires one optional BayStack 400-ST1 Cascade Module kit per stacked unit. See your Nortel Networks sales representative for ordering information).
- Spanning Tree Protocol (STP): Complies with IEEE 802.1D standard. STP can be disabled on the entire switch or stack, or on a per-port basis.
- SNMP agent support for the following management information bases (MIBs):

  -- SNMPv2 (RFC 1907)

  -- Bridge MIB (RFC 1493)

  -- Ethernet MIB (RFC 1643)

  -- RMON MIB (RFC 1757)

  -- MIB-II (RFC 1213)

  -- Interface MIB (RFC 1573)

  -- Nortel Networks proprietary MIBs:

  - s5Chas MIB

  - s5Agent MIB

  - Rapid City MIB
- High-speed uplink/expansion slot: Allows you to attach optional media dependent adapters (MDAs) that support a range of media types.
- Rate limiting: Adjustable broadcast or IP Multicast packet-rate limits for control of broadcast and IP Multicast storms.

- Console/Comm port: Allows users to configure and manage the switch locally or remotely.
- Virtual local area networks (VLANs), supporting:
  - -- IEEE 802.1Q port-based VLANs
  - -- Protocol-based VLANs
- TELNET:
  - -- Support for up to four simultaneous TELNET sessions
  - -- Optional password protection
  - -- Login time-out
  - -- Failed-login guard
  - -- Inactivity time-out
  - -- Allowed source addresses
  - -- Event logging
- IEEE 802.1Q port-based virtual LANs (VLANs)
- IGMP snooping
- IEEE 802.1p prioritizing
- MultiLink Trunking, supporting:
  - -- Switch-to-switch trunks
  - -- Switch-to-server trunks
- Port mirroring (conversation steering)
  - -- Port-based
  - -- MAC address-based
- IEEE 802.3u-compliant optional MDA autonegotiation ports, with four modes:
  - -- 10BASE-T half-duplex
  - -- 10BASE-T full-duplex
  - -- 100BASE-TX half-duplex
  - -- 100BASE-TX full-duplex

- Front panel light emitting diodes (LEDs) to monitor the following:

  -- Power status

  -- System status

  -- Stack status for the following:

  - Cascade Up and Cascade Down status

  - Base unit status

  -- RPSU status

  -- Per-port status for the following:

  - 10 Mb/s link

  - Tx/Rx activity

  - Management enable/disable

- Upgradeable device firmware in nonvolatile flash memory using the Trivial File Transfer Protocol (TFTP)
- Configuration file download/upload support: Allows you to store your switch/stack configuration parameters on a TFTP server.
- Remote monitoring (RMON), with four groups integrated:

  -- Statistics

  -- History

  -- Alarms

  -- Events

- RADIUS network security: Allows you to set up your switch with RADIUS-based (Remote Authentication Dial-In User Services) security, for authenticating local console and TELNET logins.

IEEE 802.1p Prioritizing

The BayStack 410-24T switch can prioritize the order in which packets are forwarded, on a per-port basis.

For more information about the 802.1p prioritizing feature, see "IEEE 802.1p Prioritizing" on page 1-53.

Virtual Local Area Networks (VLANs)

In a traditional shared-media network, traffic generated by a station is propagated to all other stations on the local segment. Therefore, for any given station on the shared Ethernet, the local segment is the *collision domain* because traffic on the segment has the potential to cause an Ethernet collision. The local segment is also the *broadcast domain* because any broadcast is sent to all stations on the local segment. Although Ethernet switches and bridges divide a network into smaller collision domains, they do not affect the broadcast domain. In simple terms, a virtual local area network provides a mechanism to fine-tune broadcast domains.

Your BayStack 410-24T switch allows you to create two types of VLANs:

- Port-based VLANs

  A port-based VLAN is a VLAN in which the ports are explicitly configured to be in the VLAN. When you create a port-based VLAN, you assign a Port VLAN Identifier (PVID) and specify which ports belong to the VLAN. The PVID is used to coordinate VLANs across multiple switches.

- Protocol-based VLANs

  A protocol-based VLAN is a VLAN in which you assign your switch ports as members of a broadcast domain, based on the protocol information within the packet. Protocol-based VLANs can localize broadcast traffic and assure that only the protocol-based VLAN ports are flooded with the specified protocol type packets.

BayStack 410-24T switches support up to 64 port-based or protocol-based VLANs. When a switch port is configured to be a member of a VLAN, it is added to a group of ports (workgroup) that belong to one broadcast domain. You can assign different ports (and therefore the devices attached to these ports) to different broadcast domains. This feature allows network flexibility because you can reassign VLANs to accommodate network moves, additions, and changes, eliminating the need to change physical cabling.

For more information about VLANs, see "IEEE 802.1Q VLAN Workgroups" on page 1-32.

RADIUS-Based Network Security

The RADIUS-based security feature allows you to set up network access control, using the RADIUS (Remote Authentication Dial-In User Services) security protocol. The RADIUS-based security feature uses the RADIUS protocol to authenticate local console and TELNET logins.

You will need to set up specific user accounts (user names and passwords, and Service-Type attributes) on your RADIUS server before the authentication process can be initiated.

To provide each user with appropriate levels of access to the switch, set the following username attributes on your RADIUS server:

- Read-write access -- Set the Service-Type field value to Administrative.
- Read-only access -- Set the Service-Type field value to NAS-Prompt.

For detailed instructions about setting up your RADIUS server, refer to your RADIUS server documentation. For instructions on using the console interface (CI) to set up the Radius-based security feature, see “Console/Comm Port Configuration” on page 3-65.

IGMP Snooping Feature

For conserving bandwidth and controlling IP Multicast, the IGMP snooping feature can provide the same benefit as IP Multicast routers, but in the local area. For more information about the IGMP snooping feature, see “IGMP Snooping” on page 1-48.

Configuration and Switch Management

The BayStack 410-24T switch is shipped directly from the factory ready to operate in any 10BASE-T network. Optional MDAs are available for connecting to 100BASE-T networks. You can manage the switch using the Nortel Networks Optivity® network management software, Nortel Networks Device Manager Software, or any generic SNMP-based network management software; however, you must assign an IP address to the switch or stack, depending on the mode of operation. You can set both addresses by using the Console/Comm Port or BootP, which resides on the switch. For more information about using the Console/Comm Port to configure the switch, see Chapter 3, “Using the Console Interface.”

Flash Memory Storage

Storage of Switch Software Image

The BayStack 410-24T switch uses flash memory to store the switch software image. The flash memory allows you to update the software image with a newer version without changing the switch hardware (see “Software Download” on page 3-85). An in-band connection between the switch and the TFTP load host is required to download the software image.

If a BootP server is set up properly on the network and the BayStack 410-24T switch detects a corrupted software image during the self-test, the switch automatically uses TFTP to download a new software image.

Storage of Configuration Parameters

Certain configuration parameters, including the system characteristics strings, some VLAN parameters, IGMP configuration parameters, and the MultiLink Trunk names are stored in flash memory. These parameters are updated every 10 minutes *or whenever a reset command is executed*.

Note: Do not power off the switch within ten minutes of changing any configuration parameters, *unless you first reset the switch*. Powering down the switch within 10 minutes of changing configuration parameters (without resetting) can cause the changed configuration parameters to be lost.

IEEE 802.1Q VLANs

BayStack 410-24T switches support up to 64 port-based VLANs with IEEE 802.1Q tagging available per port. When a switch port is configured to be a member of a VLAN, it is added to a group of ports (workgroup) that belong to one broadcast domain. You can assign different ports (and therefore the devices attached to these ports) to different broadcast domains. This feature allows network flexibility because you can reassign VLANs to accommodate network moves, additions, and changes, eliminating the need to change physical cabling.

For more information about 802.1Q VLANs, see “IEEE 802.1Q VLAN Workgroups” on page 1-32.

Autosensing and Autonegotiation

BayStack 410-24T switches are autosensing and autonegotiating devices. The term *autosense* refers to a port's ability to *sense* the speed of an attached device. The term *autonegotiation* refers to a standardized protocol (IEEE 802.3u) that exists between two IEEE 802.3u-capable devices.

Because the BayStack 410-24T switch uses *fixed* 10BASE-T ports, the autonegotiation feature does not negotiate the port speed when connecting to another IEEE 802.3u-capable device. The BayStack 410-24T switch only negotiates the best duplex mode.

When an optional 10/100 BASE-T MDA is installed, the autonegotiation feature selects the best of *both* speed and duplex modes for that connection. The MDA ports negotiate down from 100 Mb/s speed and full-duplex mode until a supported speed and duplex mode is acknowledged by the attached device.

Autosensing is used when the attached device is not capable of autonegotiation or is using a form of autonegotiation that is not compatible with the IEEE 802.3u autonegotiation standard. In this case, because it is not possible to sense the duplex mode of the attached device, the BayStack 410-24T switch reverts to half-duplex mode.

For more information about autosensing and autonegotiation modes, see "Autonegotiation Modes" on page 4-7.

MultiLink Trunking

The MultiLink Trunking feature allows you to group multiple ports (up to four) together when forming a link to another switch or server, thus increasing aggregate throughput of the interconnection between two devices (up to 800 Mb/s in full-duplex mode when an optional 100BASE-T MDA is installed). BayStack 410-24T switches can be configured with up to six MultiLink Trunks. The trunk members can be configured within a single unit in the stack or distributed between any of the units within the stack configuration (distributed trunking).

For more information about the MultiLink Trunking feature, see "MultiLink Trunks" on page 1-57.

Port Mirroring

The port mirroring feature (sometimes referred to as *conversation steering*) allows a user to designate a single switch port as a traffic monitor for up to two specified ports or two media access control (MAC) addresses. You can specify *Port-Based* monitoring, where all traffic on specified ports is monitored, or *Address-Based* monitoring, where traffic between specified MAC addresses is monitored. You can attach a probe device (such as a Nortel Networks StackProbe, or equivalent) to the designated monitor port.

For more information about the port mirroring feature, see "Port Mirroring (Conversation Steering)" on page 1-76.

BootP Automatic IP Configuration/MAC Address

The BayStack 410-24T switch has a unique 48-bit hardware address, or MAC address, that is printed on a label on the back panel. You use this MAC address when you configure the network BootP server to recognize the BayStack 410-24T switch BootP requests. A properly configured BootP server enables the switch to automatically learn its assigned IP address, subnet mask, IP address of the default router (default gateway), and software image file name.

When the switch is participating in a stack configuration, a *Stack MAC address* is automatically assigned during the stack initialization. The base unit's MAC address, with a software offset, is used for the Stack MAC address.

For example, if the base unit's MAC address is:

00-00-82-99-44-00

and the Stack software offset is:

```
1F
```

then the Stack MAC address becomes:

```
00-00-82-99-44-1F
```

If another unit in the stack is assigned as the base unit, the MAC address of the *new* base unit (with offset) now applies to the stack configuration. The original stack IP address still applies to the new base unit.

For an example of a BootP configuration file, see Appendix F, "Sample BootP Configuration File."

SNMP MIB Support

The BayStack 410-24T switch supports an SNMP agent with industry standard MIBs, as well as private MIB extensions, which ensures compatibility with existing network management tools. The BayStack 410-24T switch supports the MIB-II (RFC 1213), the Bridge MIB (RFC 1493), and the RMON MIB (RFC 1757), which provide access to detailed management statistics.

For a complete listing of supported MIBs, see "Features" on page 1-9.

For details on SNMP trap support, see "SNMP Trap Support" following this section.

SNMP Trap Support

The BayStack 410-24T switch supports an SNMP agent with industry standard SNMPv1 traps, as well as private SNMPv1 trap extensions (Table 1-3).

Table 1-3. Supported SNMP Traps

Trap Name	Configurable	Sent when:
RFC 1215 (Industry Standard) :		
linkUp	Per port	A port's link state changes to up.
linkDown	Per port	A port's link state changes to down.
authenticationFailure	System wide	There is an SNMP authentication failure.
coldStart	Always on	The system is powered on.
warmStart	Always on	The system restarts due to a management reset.
s5Ctr MIB (Nortel Networks Proprietary Traps):		
s5CtrUnitUp	Always on	A unit is added to an operational stack.
s5CtrUnitDown	Always on	A unit is removed from an operational stack.
s5CtrHotSwap	Always on	A unit is hot-swapped in an operational stack.
s5CtrProblem	Always on	An assigned base unit fails.

Network Configuration

You can use BayStack 410-24T switches to connect workstations, personal computers (PCs), and servers to each other by connecting these devices directly to the switch, through a shared media hub that is connected to the switch, or by creating a virtual LAN (VLAN) through the switch.

This section provides four network configuration examples using BayStack 410-24T switches:

- Desktop switch application
- Segment switch application
- High-density switched workgroup application
- Fail-safe stack application

Desktop Switch Application

Figure 1-5 shows the BayStack 410-24T switch used as a desktop switch, where desktop workstations are connected directly to switch ports.

This configuration uses the optional 400-4TX MDA (10BASE-T/100BASE-TX) and provides dedicated 100 Mb/s connections to the network center, to the server, and for two users. Twenty-four users are provided with dedicated 10 Mb/s connections.

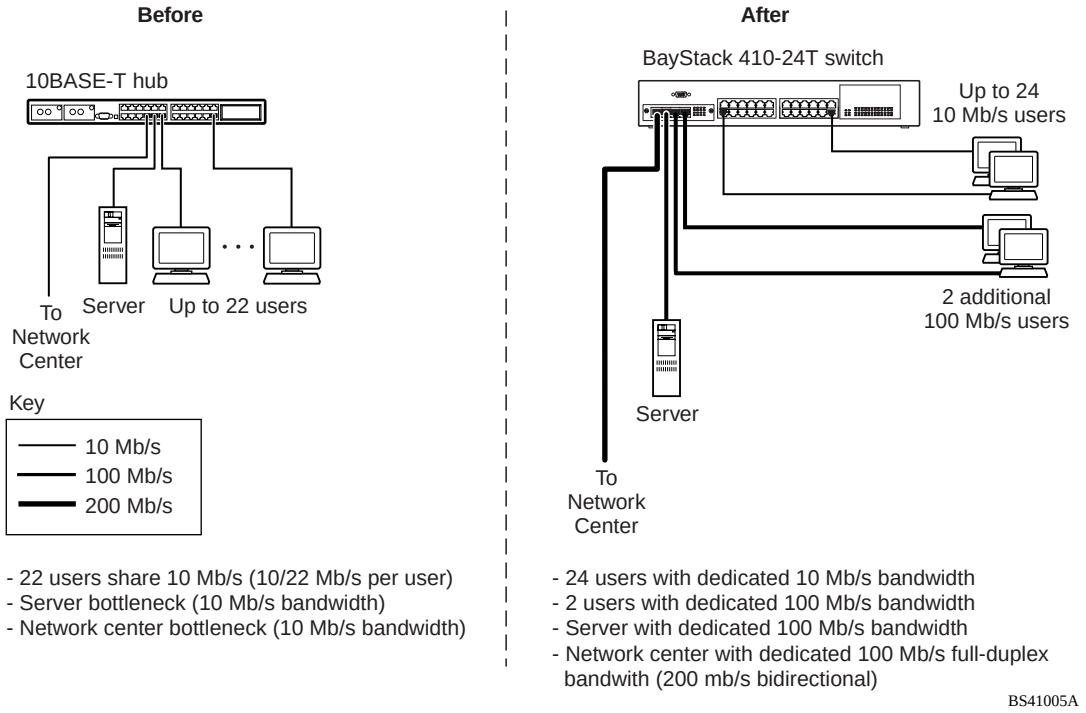

Before
10BASE-T hub
To Network Center
Server
Up to 22 users
Key
10 Mb/s
100 Mb/s
200 Mb/s
- 22 users share 10 Mb/s (10/22 Mb/s per user)
- Server bottleneck (10 Mb/s bandwidth)
- Network center bottleneck (10 Mb/s bandwidth)
After
BayStack 410-24T switch
Up to 24 10 Mb/s users
2 additional 100 Mb/s users
Server
To Network Center
- 24 users with dedicated 10 Mb/s bandwidth
- 2 users with dedicated 100 Mb/s bandwidth
- Server with dedicated 100 Mb/s bandwidth
- Network center with dedicated 100 Mb/s full-duplex bandwith (200 mb/s bidirectional)
BS41005A

Figure 1-5. BayStack 410-24T Switch Used as a Desktop Switch

Segment Switch Application

Figure 1-6 shows the BayStack 410-24T switch used as a segment switch to alleviate user contention for bandwidth and eliminate server and network bottlenecks. Before segmentation, 88 users had a total bandwidth of only 10 Mb/s available. After segmentation, 114 users have 40 Mb/s, four times the previous bandwidth, while adding 22 dedicated 10 Mb/s connections. This configuration can be extended to add more segments without degrading performance.

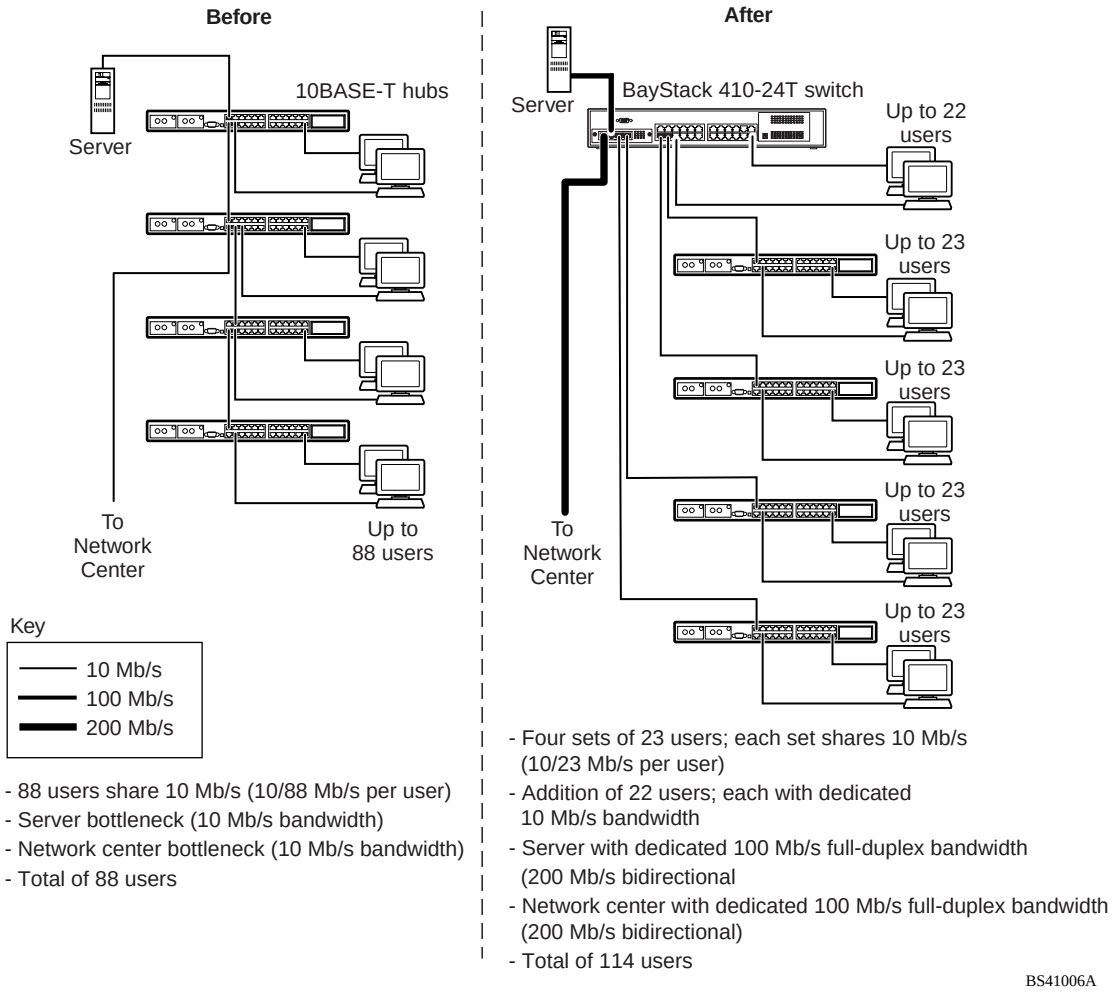


Figure 1-6. BayStack 410-24T Switch Used as a workgroup Switch

High-Density Switched Workgroup Application

Figure 1-7 shows a BayStack 410-24T switch using an (optional) 400-4TX MDA to connect to a BayStack 450 switch. The Baystack 450 switch provides a high-speed connection to a Nortel Networks Accelar™ 1100 switch. BayStack 303 and 304 switches are also shown in this high-density workgroup example.

The Accelar 1100 switch is used as a backbone switch, connecting to the BayStack 450 switch configured with a gigabit (1000BASE-SX) MDA for maximum bandwidth. The BayStack 303 and 304 switches have 100 Mb/s connections to the BayStack 410-24T switch, a 100BASE-TX hub, and a 100 Mb/s server and 10 Mb/s connections to DTE (data terminal equipment).

See the Nortel Networks library Web page: *support.baynetworks.com/library/* for online documentation about the Nortel Networks Accelar 1100 switch and the BayStack 303 and 304 switches.

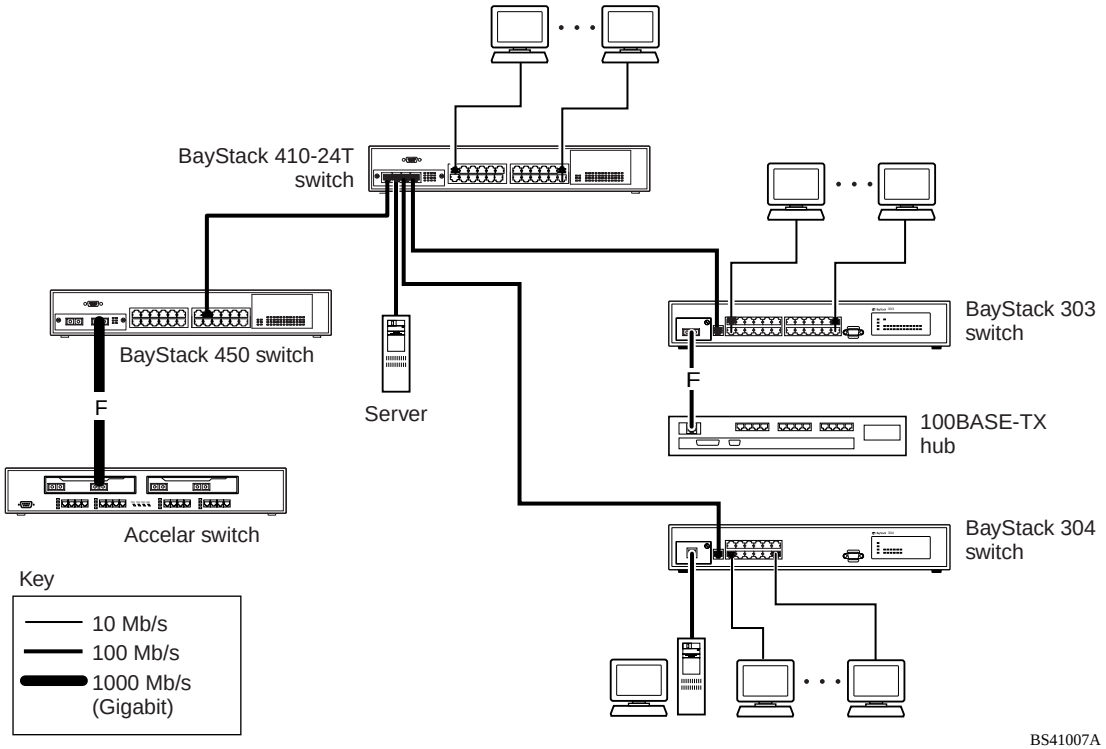


Figure 1-7. Configuring Power Workgroups and a Shared Media Hub

Fail-Safe Stack Application

Figure 1-8 shows eight switches (a single BayStack 450 switch and seven BayStack 410-24T switches) that are stacked together as a single managed unit. If any unit in the stack fails, the remaining stack remains operational.

As shown in Figure 1-8, an Accelar 1100 switch is used as a backbone switch, connecting to a BayStack 450 switch with an optional gigabit 1000BASE-SX MDA for maximum bandwidth (the BayStack 410-24T switch does not support gigabit MDAs).

This configuration uses optional BayStack 400-ST1 Cascade Modules to connect the switches in the fail-safe stack. For an overview of the fail-safe stacking feature that is available for the BayStack 410-24T switches, see "Stack Operation" following this section.

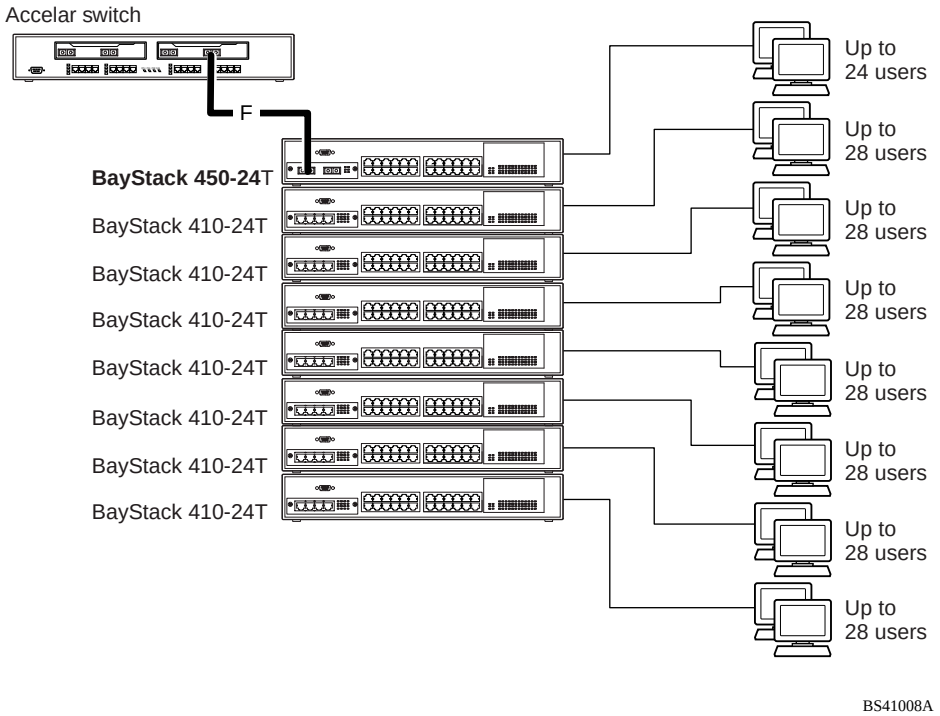


Figure 1-8. Fail-Safe Stack Example

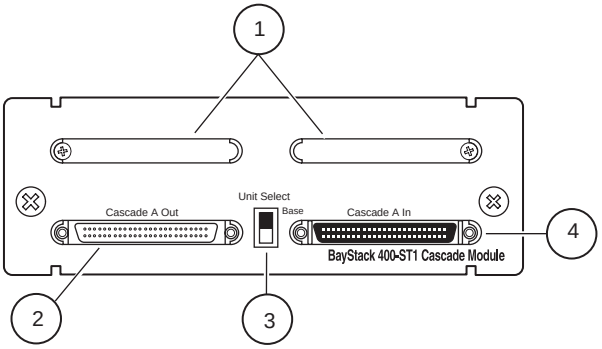
Stack Operation

BayStack 410-24T switches provide fail-safe stacking when you install the optional BayStack 400-ST1 Cascade Module (see "Fail-Safe Stack Application" on page 1-22). You can connect up to eight switches to provide uninterrupted connectivity for up to 224 ports. The entire stack is manageable as a single unit. Installation instructions are provided with the BayStack 400-ST1 Cascade Module (see your Nortel Networks sales representative for ordering information).

BayStack 400-ST1 Cascade Module

The front panel components of the BayStack 400-ST1 Cascade Module are shown in Figure 1-9.

Component descriptions follow the figure.



1 = Blank connectors (unused)
2 = Cascade A Out connector
3 = Unit Select switch
4 = Cascade A In connector

BS41009A

Figure 1-9. BayStack 400-ST1 Front Panel Components

Cascade A Out Connector

Provides an attachment point for connecting this unit to another unit via the cascade cable. A *return* cable from another unit's Cascade A Out connector to this unit's Cascade A In connector completes the stack connection (see the example shown in Figure 1-10).

Unit Select Switch

The Unit Select switch (up = Base) determines the *base unit* for the stack configuration (see "Initial Installation" on page 1-25). The Unit Select switch status is displayed on the BayStack 410-24T switch LED display panel. When the Unit Select switch is in the Base (up) position, all other Unit Select switches in the stack configuration must be set to Off (down).

Cascade A In Connector

Provides an attachment point for accepting a cascade cable connection from an adjacent unit in the stack. A *return* cable from this unit's Cascade A Out connector to the adjacent unit's Cascade A In connector completes the stack connection (see the example shown in Figure 1-10).

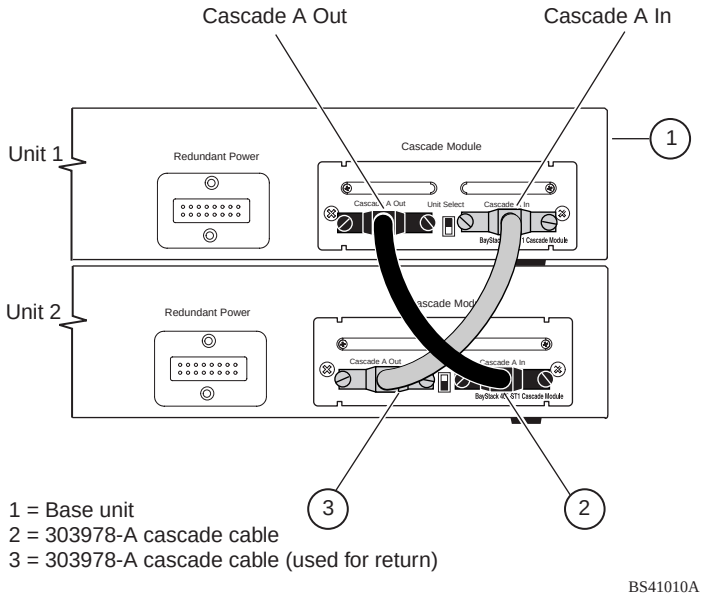


Figure 1-10. Connecting Cascade Cables

Note: For stacking three or more units (maximum 8 units per stack), order the optional 1 meter (39.27 inch) cascade max-return cable (Bay Networks Order No. AL2018001).

Base Unit

The base unit is the unique stack unit that is configured by the Unit Select switch on the front panel of the 400-ST1 cascade module. One unit in the stack *must* be configured as the base unit; all other units in the stack must have their Unit Select switch set to Off (see "Unit Select Switch" on page 1-24). Any single unit in the stack can be assigned as the base unit.

Note: Although any single unit in the stack can be assigned as the base unit, when mixing BayStack models in a single stack, Nortel Networks recommends that you assign the unit with the highest bandwidth as the base unit. The additional workload of the base unit is optimized by using the higher bandwidth model switch.

The physical ordering of all of the other units in the stack is determined by the position of the base unit within the stack. This is important for management applications that view the physical ordering of the units within the stack.

Some characteristics of the base unit are described in the following sections.

Initial Installation

During the *initial installation* of the stack, the software automatically determines the physical order of all units in the stack according to the position of the base unit within the stack. Thereafter, the individual units maintain their original unit numbering, even if the position of one or more units in the stack is changed (you can renumber the units using the Renumber Stack Units screen; see "Renumber Stack Units" on page 3-72).

For example, when the stack is initially powered up, the base unit becomes unit 1 and the unit that the base unit connects to (via the Cascade A Out cable) becomes unit 2 (and the next unit is unit 3 and so on), until the maximum stack configuration (up to 8 units) is reached. If the base unit is changed to another unit in the stack, the new base unit keeps its original unit number in the stack.

Stack MAC Address

The *Stack MAC address* is automatically assigned during the stack initialization. The base unit's MAC address, with a software offset, is used for the Stack MAC address.

For example, if the base unit's MAC address is:

00-00-82-99-44-00

and the Stack software offset is: 1F

then the Stack MAC address becomes:

00-00-82-99-44-1F

If another unit in the stack is assigned as the base unit, the MAC address of the *new* base unit (with offset) now applies to the stack configuration. The original stack IP address still applies to the new base unit.

Temporary Base Unit

If an assigned base unit fails, the next unit in the stack order automatically becomes the new *temporary base unit*. This change is indicated by the Base LED on the temporary base unit's LED display panel turning on (amber). For detailed information about the base LED, see Table 1-1 on page 1-4.

This automatic process is a temporary safeguard only. If the stack configuration loses power, the temporary base unit will not power up as the base unit when power is restored. For this reason, you should always assign the temporary base unit as the base unit (set the Unit Select switch to Base) until the failed unit is repaired or replaced.

Note: If you do not reassign the temporary base unit as the new base unit, and the temporary base unit fails, the next unit directly downstream from this unit becomes the new temporary base unit. This process can continue until there are only two units left in the stack configuration.

Removing a Unit from the Stack

If a unit is removed from the stack (therefore operating in standalone mode), the following switch configuration settings revert back to the settings configured before the unit became a member of the stack:

- IP address
- Console password
- TELNET password
- SNMP community strings

Stack Configurations

As shown in Figure 1-11, the cascade connectors and cables on the 400-ST1 front panel provide the ability to stack up to eight BayStack switches. With 400-4TX MDAs installed in each switch, the stack can accommodate a maximum of 224 switch ports.

Because stack parameters are associated with the base unit (see "Initial Installation" on page 1-25), the physical stack order depends on the base unit's position and whether the stack is configured *stack up* or *stack down.*

Stack Up Configurations

In Figure 1-11, data flows from the base unit (unit 1) to the next switch, which is assigned as unit 2, and continues until the last switch in the stack is assigned as unit 8. The physical order of the switches is *from bottom to top* (unit 1 to unit 8).

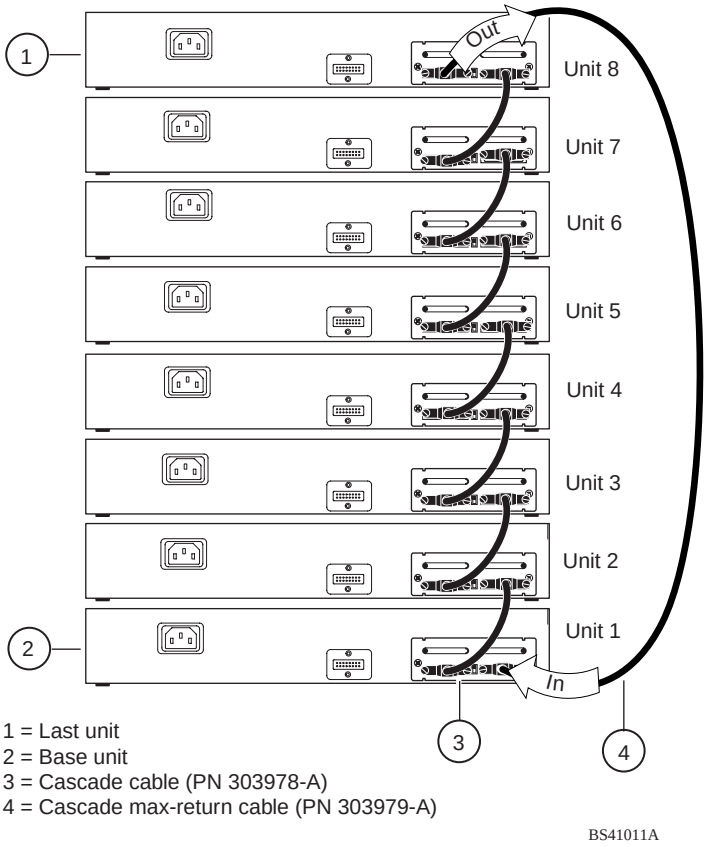


Figure 1-11. Stack Up Configuration Example

Stack Down Configurations

In Figure 1-12, data flows from the base unit (unit 1) to the next switch, which is assigned as unit 2, and continues until the last switch in the stack is assigned as unit 8. The physical order of the switches is *from top to bottom* (unit 1 to unit 8).

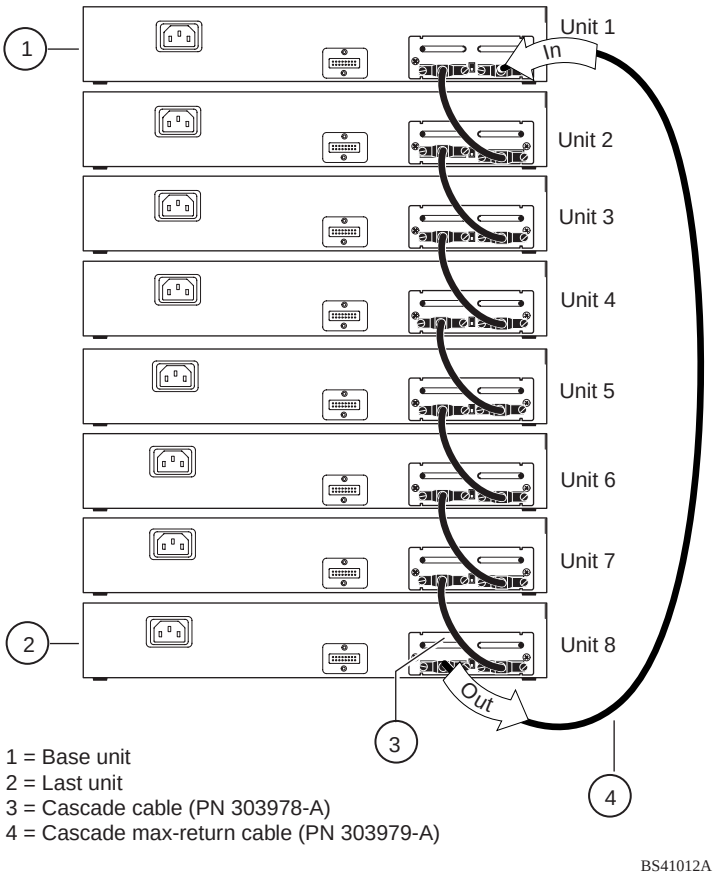


Figure 1-12. Stack Down Configuration Example

Certain network management station (NMS) applications assume a stack-down configuration for the graphical user interface (GUI) that represents the stack (see Figure 1-12 on page 1-29). For this reason, Nortel Networks recommends that you always configure the top unit in the stack as the base unit.

In any stack configuration, the following applies:

- The entire stack powers up as a single logical unit within 30 seconds after the base unit initialization.
- You can attach an RS-232 communications cable to the Console/Comm port of any switch in the stack.

- You can downline upgrade the entire stack from any switch in the stack.
- You can access and manage the stack using a TELNET connection or any generic SNMP management tool through any switch port that is part of the stack configuration.
- When stacking three or more switches, use the longer (1-meter) cascade max-return cable (PN 303979-A) to complete the link from the last unit in the stack to the base unit.

Redundant Cascade Stacking Feature

BayStack 410-24T Switches allow you to connect up to 8 units into a redundant cascade stack. If any single unit fails or if a cable is accidently disconnected, other units in the stack remain operational, without interruption.

Figure 1-13 shows an example of how a stack configuration reacts to a failed or powered-down unit in the stack configuration:

1. As shown in Figure 1-13, unit 3 is not operational.

   This can be the result of a failed unit, or simply because the unit was powered down.

2. Unit 2 and unit 4, directly upstream and downstream from unit 3, sense the loss of link signals from unit 3.
   - Unit 2 and unit 4 automatically loop their internal stack signals (A and B).
   - The Cas Up LED for unit 2 and the Cas Dwn LED for unit 4 turn on (amber) to indicate that the stack signals are looped.
3. The remaining stack units remain connected.

Although the example shown in Figure 1-13 shows a failed unit causing the stack to loop signals at the points of failure (A and B), the system reacts the same way if a cable is removed.

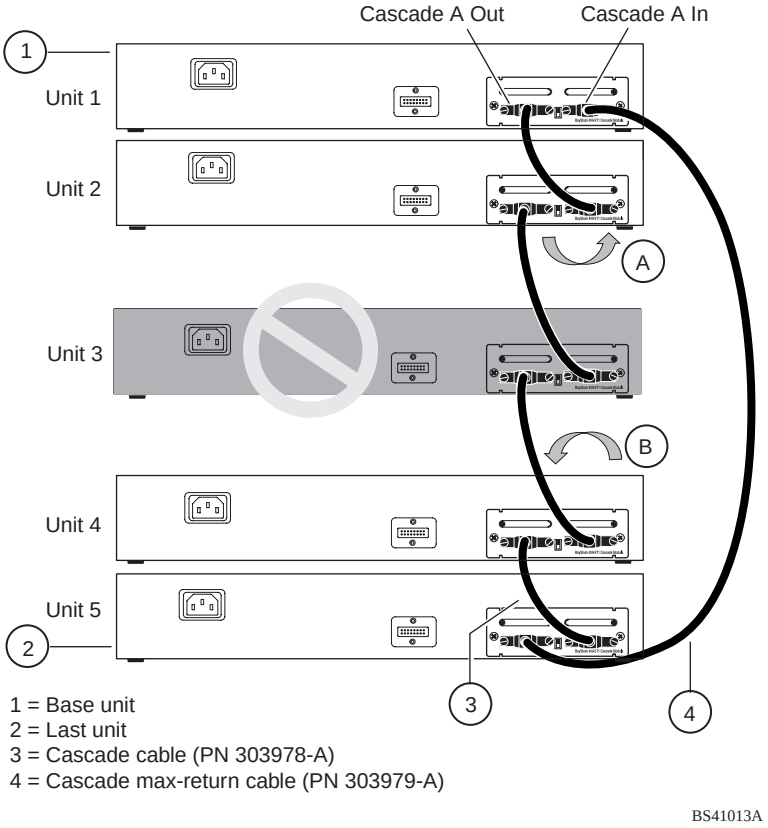


Figure 1-13. Redundant Cascade Stacking Feature

IEEE 802.1Q VLAN Workgroups

BayStack 410-24T switches support up to 64 VLANs with 802.1Q tagging available per port. Ports are grouped into broadcast domains by assigning them to the same VLAN. Frames received in one VLAN can only be forwarded within that VLAN, and IP Multicast frames and unknown unicast frames are flooded only to ports in the same VLAN.

Setting up virtual LANs (VLANs) is a way to segment networks to increase network capacity and performance without changing the physical network topology (Figure 1-14). With network segmentation, each switch port connects to a segment that is a single broadcast domain. When a switch port is configured to be a member of a VLAN, it is added to a group of ports (workgroup) that belong to one broadcast domain.

The BayStack 410-24T switch allows you to assign ports to VLANs using the console, TELNET, or any generic SNMP-based network management software. You can assign different ports (and therefore the devices attached to these ports) to different broadcast domains. This feature allows network flexibility because you can reassign VLANs to accommodate network moves, additions, and changes, eliminating the need to change physical cabling.

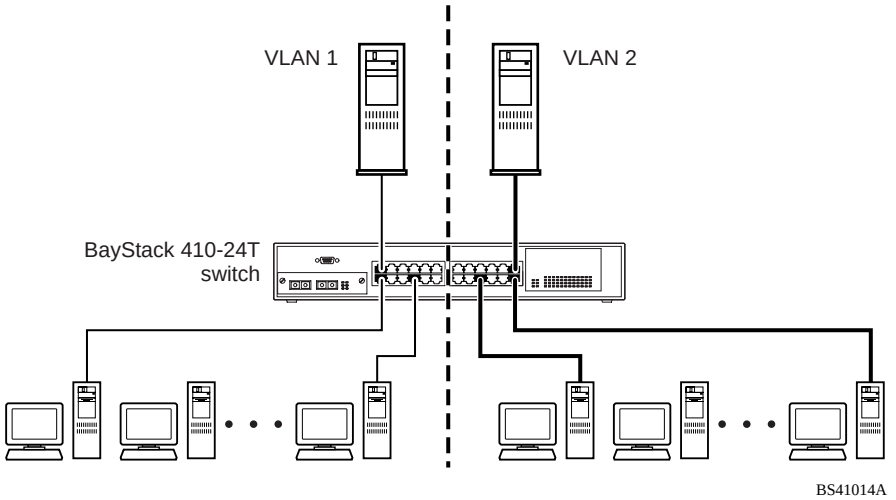


Figure 1-14. Port-Based VLAN Example

IEEE 802.1Q Tagging

BayStack 410-24T switches operate in accordance with the IEEE 802.1Q tagging rules. Important terms used with the 802.1Q tagging feature are:

- VLAN identifier (VID) -- the 12-bit portion of the VLAN tag in the frame header that identifies an explicit VLAN.
- Port VLAN identifier (PVID) -- a classification mechanism that associates a port with a specific VLAN (see Figures 1-16 to 1-19).
- Tagged frame -- the 32-bit field (VLAN tag) in the frame header that identifies the frame as belonging to a specific VLAN. Untagged frames are marked (tagged) with this classification as they leave the switch through a port that is configured as a tagged port.
- Untagged frame -- a frame that does not carry any VLAN tagging information in the frame header.
- VLAN port members -- a set of ports that form a broadcast domain for a specific VLAN. A port can be a member of one or more VLANs.
- Untagged member -- a port that has been configured as an untagged member of a specific VLAN. When an untagged frame exits the switch through an untagged member port, the frame header remains unchanged. When a tagged frame exits the switch through an untagged member port, the tag is stripped and the tagged frame is changed to an untagged frame.
- Tagged member -- a port that has been configured as a member of a specific VLAN. When an untagged frame exits the switch through a tagged member port, the frame header is modified to include the 32-bit tag associated with the VLAN assigned to that frame. When a tagged frame exits the switch through a tagged member port, the frame header remains unchanged (original VID remains).
- User_priority -- a three-bit field in the header of a tagged frame. The field is interpreted as a binary number, therefore has a value of 0 - 7. This field allows the tagged frame to carry the user-priority across bridged LANs where the individual LAN segments may be unable to signal priority information.
- Port priority -- the priority level assigned to *untagged* frames received on a port. This value becomes the user_priority for the frame. *Tagged* packets get their user_priority from the value contained in the 802.1Q frame header.
- Unregistered packet -- a tagged frame which contains a VID where the receiving port is not a member of that VLAN.

- Filtering database identifier (FID) -- the specific filtering/forwarding database within the BayStack 410-24T switch that is assigned to each VLAN. The current version of software assigns *all VLANs* to the same FID. This is referred to as Shared VLAN Learning in the IEEE 802.1Q specification.

The default configuration settings for BayStack 410-24T switches have all ports set as untagged members of VLAN 1 with all ports configured as PVID = 1. Every VLAN is assigned a unique VLAN identifier (VID) which distinguishes it from all other VLANs. In the default configuration example shown in Figure 1-15, all incoming packets are assigned to VLAN 1 by the default port VLAN identifier (PVID =1). Untagged packets enter and leave the switch unchanged.

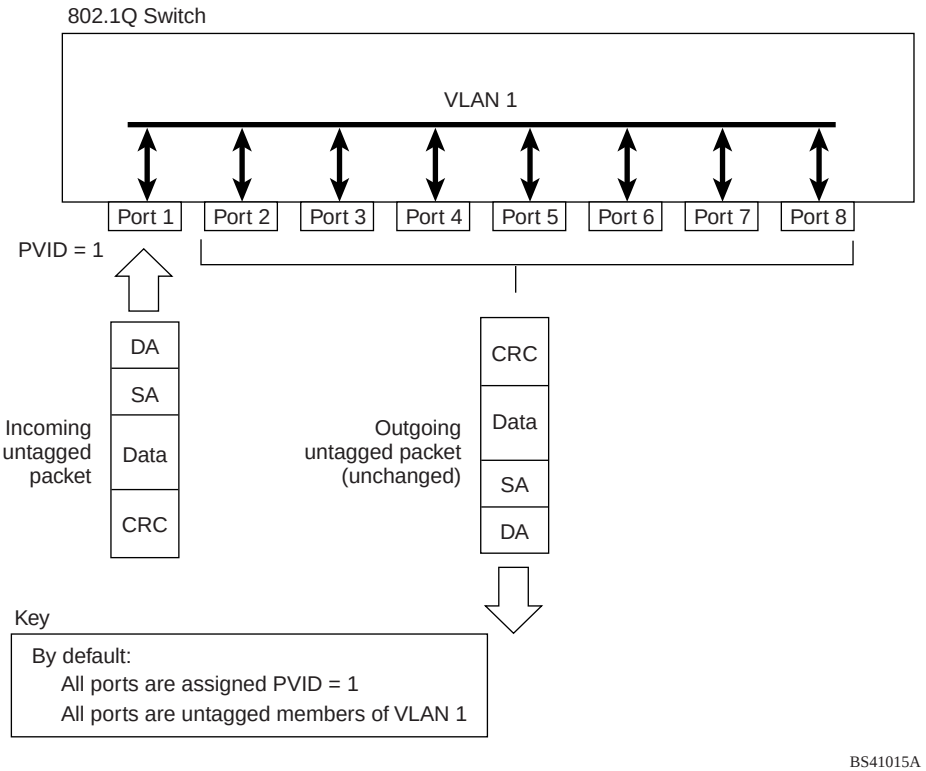


Figure 1-15. Default VLAN Settings

When configuring VLANs, you configure the switch ports as *tagged* or *untagged* members of specific VLANs (see Figures 1-16 to 1-19).

In Figure 1-16, untagged incoming packets are assigned directly to VLAN 2 (PVID = 2). Port 5 is configured as a *tagged* member of VLAN 2, and port 7 is configured as an *untagged* member of VLAN 2.

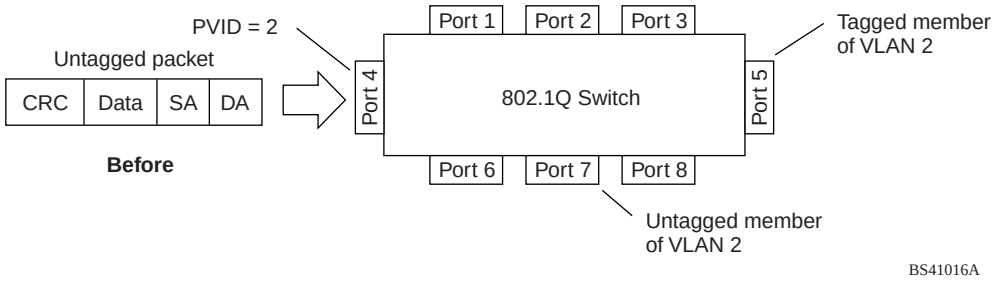


Figure 1-16. Port-Based VLAN Assignment

As shown in Figure 1-17, the untagged packet is marked (tagged) as it leaves the switch through port 5, which is configured as a tagged member of VLAN 2. The untagged packet remains unchanged as it leaves the switch through port 7, which is configured as an untagged member of VLAN 2.

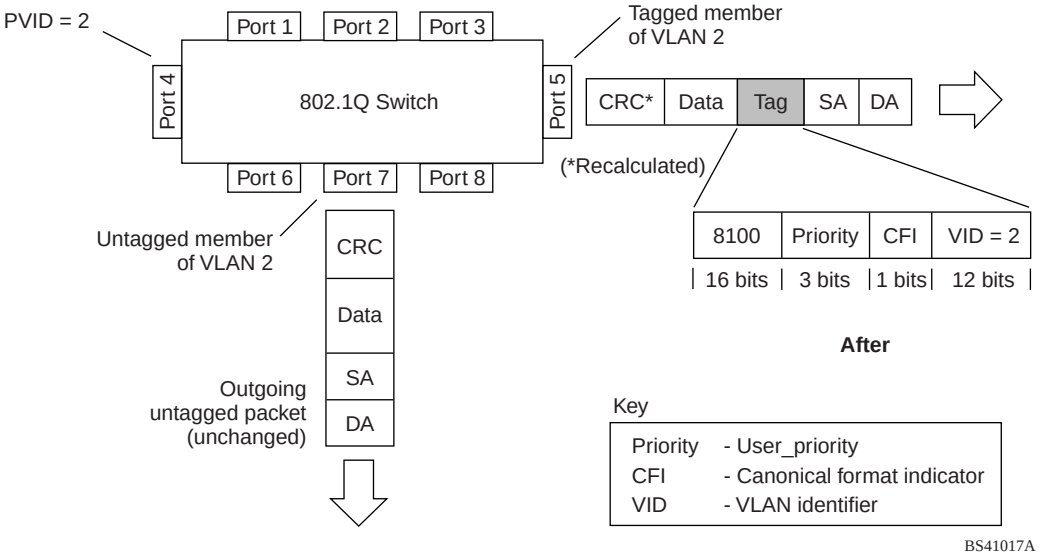


Figure 1-17. 802.1Q Tagging (After Port-Based VLAN Assignment)

In Figure 1-18, tagged incoming packets are assigned directly to VLAN 2 because of the tag assignment in the packet. Port 5 is configured as a *tagged* member of VLAN 2, and port 7 is configured as an *untagged* member of VLAN 2.

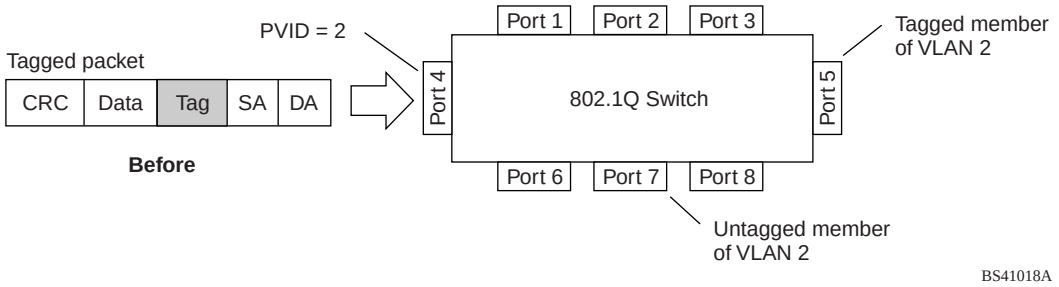


Figure 1-18. 802.1Q Tag Assignment

As shown in Figure 1-19, the tagged packet remains unchanged as it leaves the switch through port 5, which is configured as a tagged member of VLAN 2. However, the tagged packet is stripped (untagged) as it leaves the switch through port 7, which is configured as an untagged member of VLAN 2.

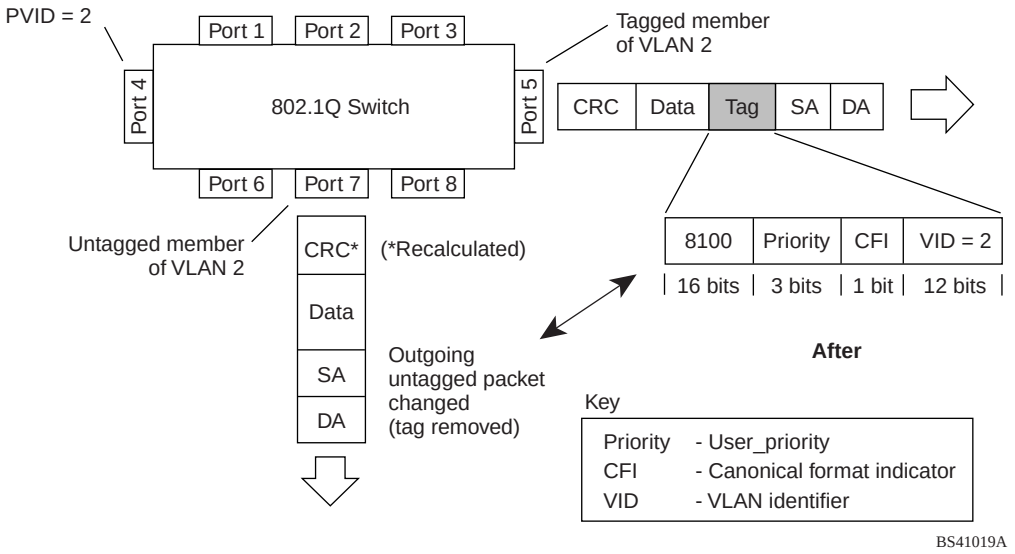


Figure 1-19. 802.1Q Tagging (After 802.1Q Tag Assignment)

VLANs Spanning Multiple Switches

You can use VLANs to segment a network within a switch. When connecting multiple switches, it is possible to connect users of one VLAN with users of that same VLAN in another switch. However, the configuration guidelines depend on whether both switches support 802.1Q tagging.

With 802.1Q tagging enabled on a port for a VLAN, all frames leaving the port for that VLAN are *marked* as belonging to that specific VLAN. Users can assign specific switch ports as members of one or more VLANs that span multiple switches, without interfering with the spanning tree protocol.

VLANs Spanning Multiple 802.1Q Tagged Switches

Figure 1-20 shows VLANs spanning two BayStack 410-24T switches. 802.1Q tagging is enabled on S1, port 2 and on S2, port 1 for VLAN 1 and VLAN 2. Both ports are tagged members of VLAN 1 and VLAN 2.

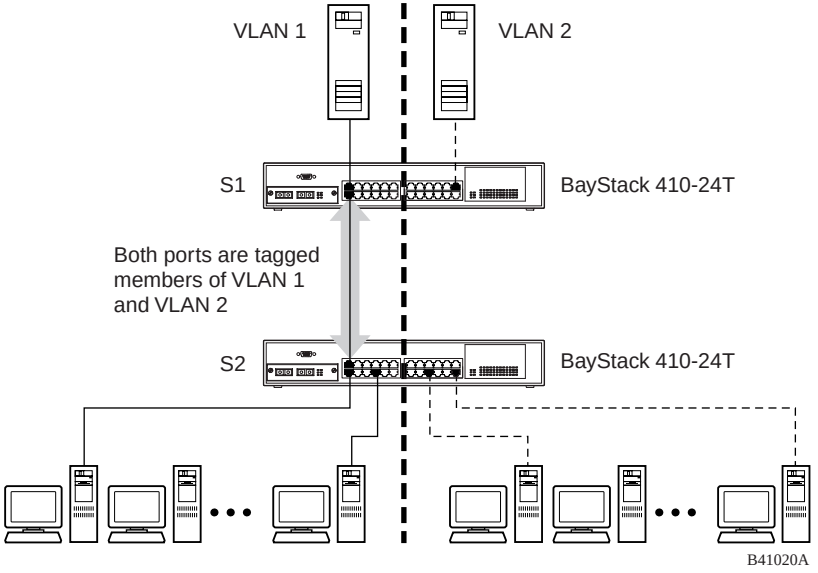


Figure 1-20. VLANs Spanning Multiple 802.1Q Tagged Switches

Because there is only one link between the two switches, the Spanning Tree Protocol (STP) treats this configuration as any other switch-to-switch connection. For this configuration to work properly, both switches must support the 802.1Q tagging protocol.

VLANs Spanning Multiple Untagged Switches

Figure 1-21 shows VLANs spanning multiple untagged switches. In this configuration switch S2 does not support 802.1Q tagging and a single switch port on each switch must be used for each VLAN.

For this configuration to work properly, spanning tree participation must be set to Disabled because the STP is not supported across multiple LANs.

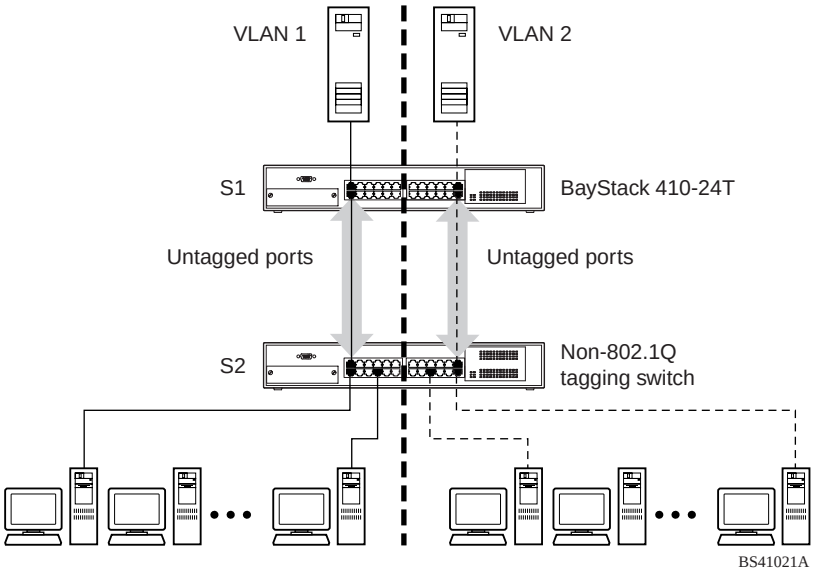


Figure 1-21. VLANs Spanning Multiple Untagged Switches

When the STP is enabled on these switches, only one link between each pair of switches will be forwarding traffic. Because each port belongs to only one VLAN at a time, connectivity on the other VLAN will be lost. Exercise care when configuring the switches to ensure that the VLAN configuration does not conflict with spanning tree configuration.

To connect multiple VLANs across switches with redundant links, the STP must be disabled on all participating switch ports. Figure 1-22 shows possible consequences of enabling the STP when using VLANs between untagged (non-802.1Q tagged) switches.

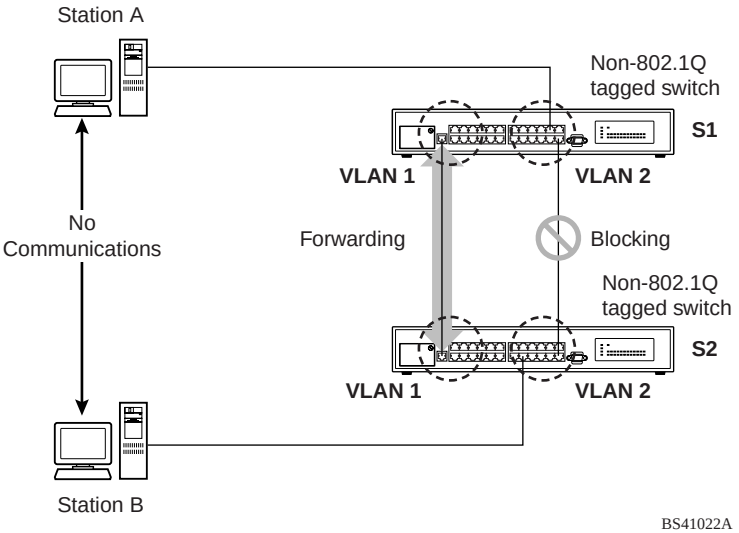


Figure 1-22. Possible Problems with VLANs and Spanning Tree Protocol

As shown in Figure 1-22, with STP enabled, only one connection between S1 and S2 is forwarding at any time. Communications failure occurs between VLAN 2 of S1 and VLAN 2 of S2, blocking communications between Stations A and B.

The link connecting VLAN 1 on Switches S1 and S2 is selected as the forwarding link based on port speed, duplex mode, and port priority. Because the other link connecting VLAN 2 is placed into Blocking mode, stations on VLAN 2 in switch S1 cannot communicate with stations in VLAN 2 on switch S2. With multiple links only one link will be forwarding.

Shared Servers

BayStack 410-24T switches allow ports to exist in multiple VLANs for shared resources, such as servers, printers, and switch-to-switch connections. It is also possible to have resources exist in multiple VLANs on one switch as shown in Figure 1-23.

In this example, clients on different broadcast domains share resources. The broadcasts from ports configured in VLAN 3 can be seen by all VLAN port members of VLAN 3.

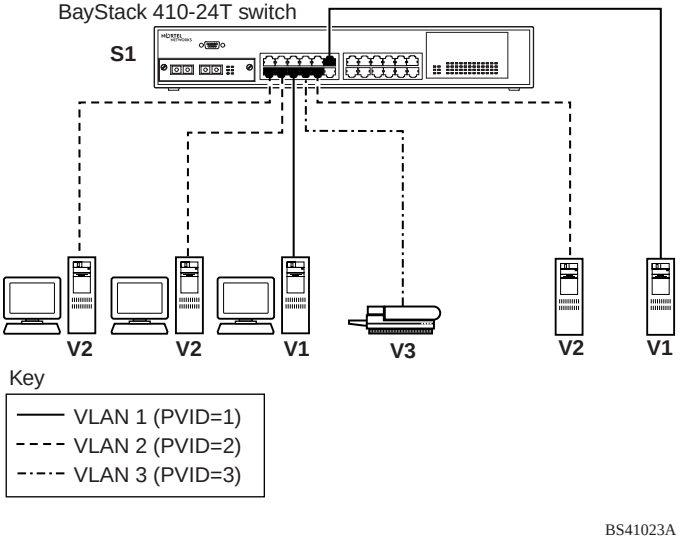


Figure 1-23. Multiple VLANs Sharing Resources

In order for the above configuration to operate as described, the ports have to be set to participate as VLAN port members. When this is done, the switch establishes the appropriate broadcast domains within the switch (see Figure 1-24).

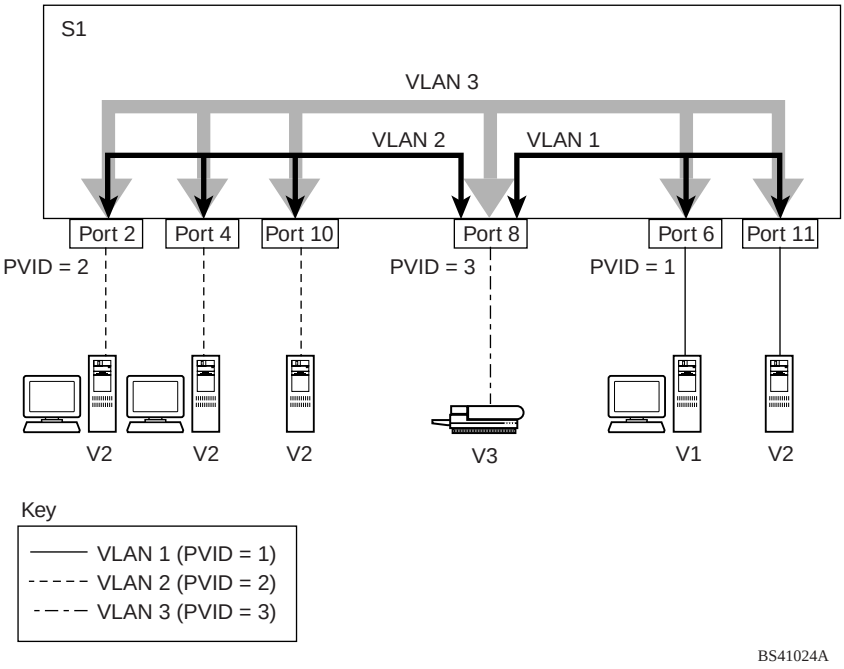


Figure 1-24. VLAN Broadcast Domains Within the Switch

The broadcast domain for each of the VLANs shown in Figure 1-24 is created by configuring VLAN port memberships for each VLAN and then configuring each of the ports with the appropriate PVID/VLAN association:

- Ports 8, 6, and 11 are untagged members of VLAN 1.

  The PVID/VLAN association for ports 6 and 11 is: PVID = 1.

- Ports 2, 4, 10, and 8 are untagged members of VLAN 2.

  The PVID/VLAN association for ports 2, 4, and 10 is: PVID = 2.

- Ports 2, 4, 10, 8, 6, and 11 are untagged members of VLAN 3.

  The PVID/VLAN association for port 8 is: PVID = 3.

The following steps show how to use the VLAN configuration screens to configure the VLAN 3 broadcast domain shown in Figure 1-24.

To configure the VLAN port membership for VLAN 1:

1. **Select Switch Configuration from the BayStack 410-24T switch Main Menu (or press w).**
2. **From the Switch Configuration Menu, select VLAN Configuration (or press v).**
3. **From the VLAN Configuration Menu select VLAN Configuration (or press v).**

   The default VLAN Configuration screen opens (Figure 1-25):

```
                        VLAN Configuration

  Create VLAN:      [    1 ]              VLAN Type:          [   Port-Based   ]
  Delete VLAN:      [      ]              Protocol Id (PID):  [      None      ]
  VLAN Name:        [ VLAN #1 ]           User-Defined PID:   [ 0x0000 ]
  Management VLAN:  [ Yes ]               VLAN State:         [     Active     ]

                 Port Membership
            1-6         7-12
           ------      ------


 Unit #1   UUUUUU      UUUUUU




KEY: T = Tagged Port Member, U = Untagged Port Member, - = Not a Member of VLAN
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-25. Default VLAN Configuration Screen Example

The VLAN Configuration screen settings shown in Figure 1-25 are default settings with all switch ports classified as *untagged* members of VLAN 1.

Figure 1-26 shows the VLAN Configuration screen after it is configured to support the VLAN 3 broadcast domain shown in Figure 1-24 (VLAN Name is optional).

Ports 2, 4, 6, 8, 10, and 11 are now untagged members of VLAN 3 as shown in Figure 1-24 on page 1-41.

```
                        VLAN Configuration

  Create VLAN:      [    3 ]              VLAN Type:          [   Port-Based   ]
  Delete VLAN:      [      ]              Protocol Id (PID): [      None      ]
  VLAN Name:        [ Mary's VLAN ]       User-Defined PID:  [ 0x0000 ]
  Management VLAN: [ Yes ]                VLAN State:         [     Active     ]

                 Port Membership
             1-6       7-12
            ------    ------


  Unit #1   -U-U-U    -U-UU-









KEY: T = Tagged Port Member, U = Untagged Port Member, - = Not a Member of VLAN
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-26. VLAN Configuration Screen Example

To configure the PVID (port VLAN identifier) for Port 8:

1. **From the VLAN Configuration screen, press [Ctrl]-R to return to the VLAN Configuration Menu.**
2. **From the VLAN Configuration Menu, select VLAN Port Configuration (or press c).**

   The default VLAN Port Configuration screen opens (Figure 1-27).

The VLAN Port Configuration screen settings shown in Figure 1-27 are default settings.

```
                        VLAN Port Configuration


              Unit:                          [ 1 ]
              Port:                          [  1  ]
              Filter Tagged Frames:          [ No  ]
              Filter Untagged Frames:        [ No  ]
              Filter Unregistered Frames:    [ No  ]
              Port Name:                     [  ]
              PVID:                          [   1 ]
              Port Priority:                 [ 0 ]
              Tagging:                       [ Untagged Access ]









Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-27. Default VLAN Port Configuration Screen Example

Figure 1-28 shows the VLAN Port Configuration screen after it is configured to support the PVID assignment for port 8, as shown in Figure 1-24 (Port Name is optional).

The PVID/VLAN association for VLAN 3 is now PVID = 3.

```
                          VLAN Port Configuration


                Unit:                          [ 1 ]
                Port:                          [  8  ]
                Filter Tagged Frames:          [ No  ]
                Filter Untagged Frames:        [ No  ]
                Filter Unregistered Frames:    [ No  ]
                Port Name:                     [ Molly's port ]
                PVID:                          [   3 ]
                Port Priority:                 [ 0 ]
                Tagging:                       [ Untagged Access ]









Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-28. VLAN Port Configuration Screen Example

VLAN Workgroup Summary

This section summarizes the VLAN workgroup examples discussed in the previous sections of this chapter.

As shown in Figure 1-29, switch S1 (a BayStack 410-24T switch) is configured with multiple VLANs:

- Ports 1, 6, 11, and 12 are in VLAN 1.
- Ports 2, 3, 4, 7, and 10 are in VLAN 2.
- Port 8 is in VLAN 3.

Because switch S4 does not support 802.1Q tagging, a single switch port on each switch must be used for each VLAN (see "VLANs Spanning Multiple Untagged Switches" on page 1-38).

The connection to switch S2 requires only one link because both switch S1 and switch S2 (BayStack 410-24T switches) support 802.1Q tagging (see "VLANs Spanning Multiple 802.1Q Tagged Switches" on page 1-37).

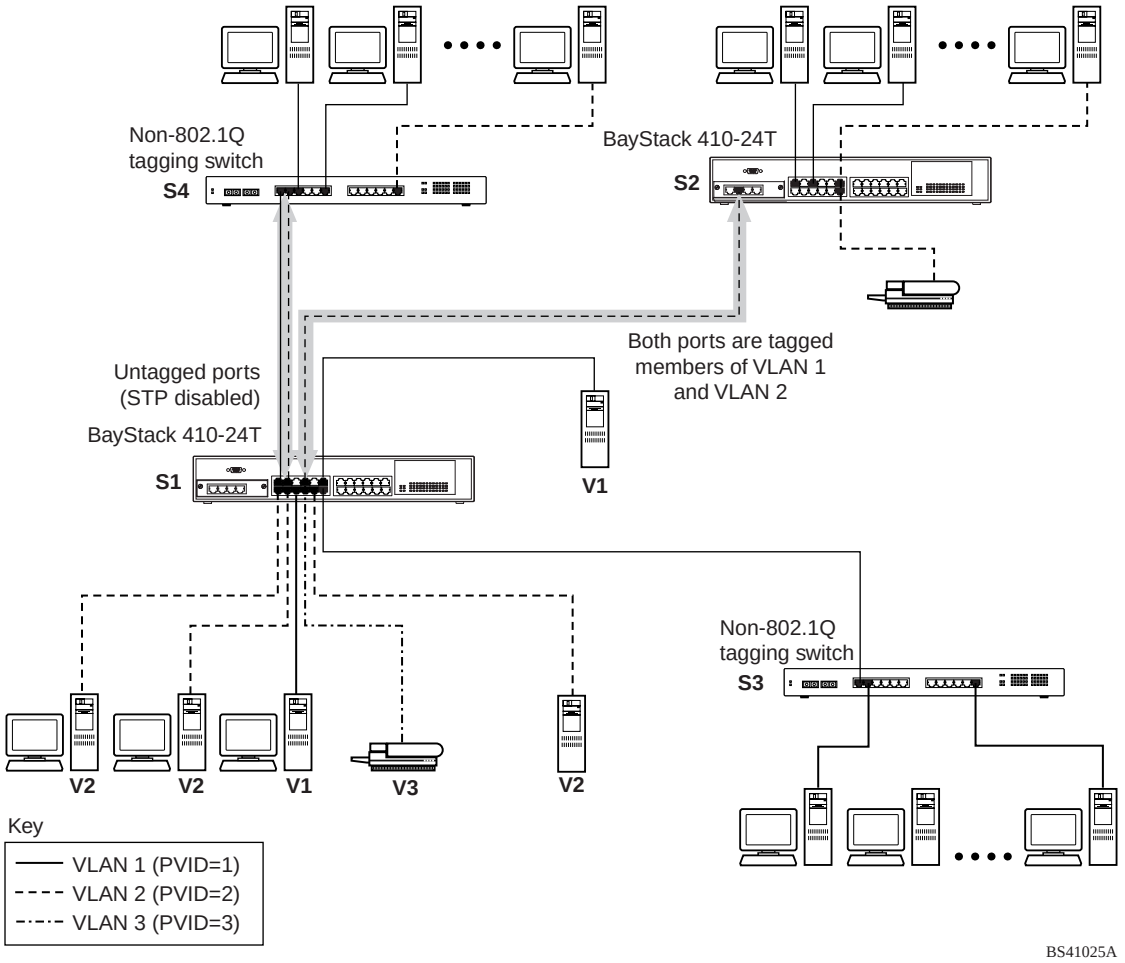


Figure 1-29. VLAN Configuration Spanning Multiple Switches

VLAN Configuration Rules

VLANs operate according to specific configuration rules. When creating VLANs, consider the following rules that determine how the configured VLAN reacts in any network topology:

- All ports that are involved in port mirroring must have memberships in the same VLANs. If a port is configured for port mirroring, the port's VLAN membership cannot be changed.
- If a port is a trunk group member, all trunk members are added or deleted from the VLAN.
- All ports involved in trunking and port mirroring must have the same VLAN configuration. If a port is on a trunk with a mirroring port, the VLAN configuration cannot be changed.
- VLANs are not dependent on rate limiting settings.
- If a port is an IGMP member on any VLAN, and is removed from a VLAN, the port's IGMP membership is also removed.
- When you add a port to a different VLAN, and it is already configured as a static router port, the port is configured as an IGMP member on that specific VLAN.

For more information about configuring VLANs, see "VLAN Configuration Menu" on page 3-22.

See also Appendix C, "Quick Steps to Features" for configuration flowcharts that can help you use this feature.

IGMP Snooping

BayStack 410-24T switches can sense IGMP host membership reports from attached stations and use this information to set up a dedicated path between the requesting station and a local IP Multicast router. After the pathway is established, the BayStack 410-24T switch blocks the IP Multicast stream from exiting any other port that does not connect to another host member, thus conserving bandwidth. The following discussion describes how BayStack 410-24T switches provide the same benefit as IP Multicast routers, but in the local area.

Internet Group Management Protocol (IGMP), is used by IP Multicast routers to learn about the existence of host group members on their directly attached subnets (see RFC 2236). The IP Multicast routers get this information by broadcasting IGMP queries and listening for IP hosts reporting their host group memberships. This process is used to set up a client/server relationship between an IP Multicast source that provides the data streams and the clients that want to receive the data.

Figure 1-30 shows how IGMP is used to set up the path between the client and server. As shown in this example, the IGMP host provides an IP Multicast stream to designated routers which forward the IP Multicast stream on their local network only if there is a recipient.

The client/server path is set up as follows:

1. The designated router sends out a *host membership query* to the subnet and receives *host membership reports* from end stations on the subnet.
2. The designated routers then set up a path between the IP Multicast stream source and the end stations.
3. Periodically, the router continues to query end stations on whether to continue participation.
4. As long as any client continues to participate, all clients, including nonparticipating end stations on that subnet, receive the IP Multicast stream.

Note: Although the nonparticipating end stations can filter the IP Multicast traffic, the IP Multicast still exists on the subnet and consumes bandwidth.

IP Multicast can be optimized in a LAN by using *IP Multicast filtering switches*, such as the BayStack 410-24T switch.

As shown in Figure 1-30, a non-IP Multicast filtering switch causes IP Multicast traffic to be sent to all segments on the local subnet.

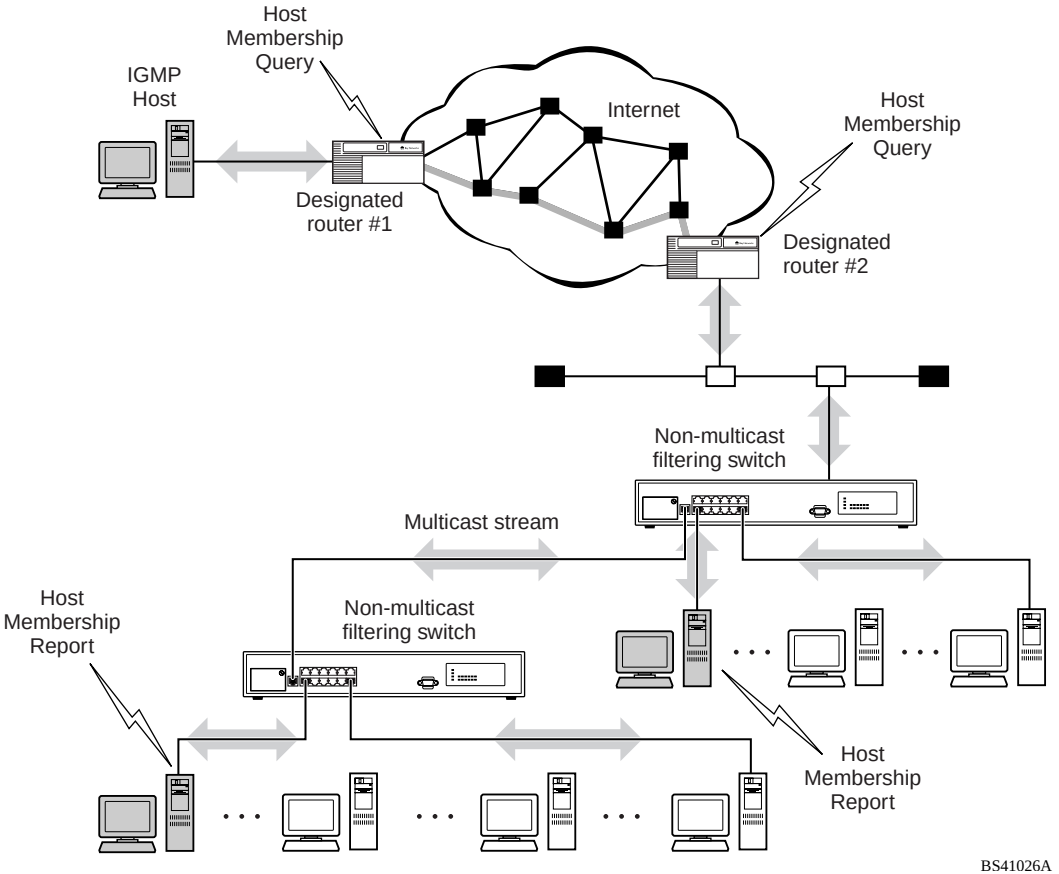


Figure 1-30. IP Multicast Propagation With IGMP Routing

The BayStack 410-24T switch can automatically set up IP Multicast filters so the IP Multicast traffic is only directed to the participating end nodes (see Figure 1-31).

In Figure 1-31, switches S1 to S4 represent a LAN connected to a IP Multicast router. The router periodically sends Host Membership Queries to the LAN and listens for a response from end stations. All of the clients connected to switches S1 to S4 are aware of the queries from the router.

One client, connected to S2, responds with a host membership report. Switch S2 intercepts the report from that port, and generates a *proxy* report to its upstream neighbor, S1. Also, two clients connected to S4 respond with host membership reports, causing S4 to intercept the reports and to generate a *consolidated proxy report* to its upstream neighbor, S1.

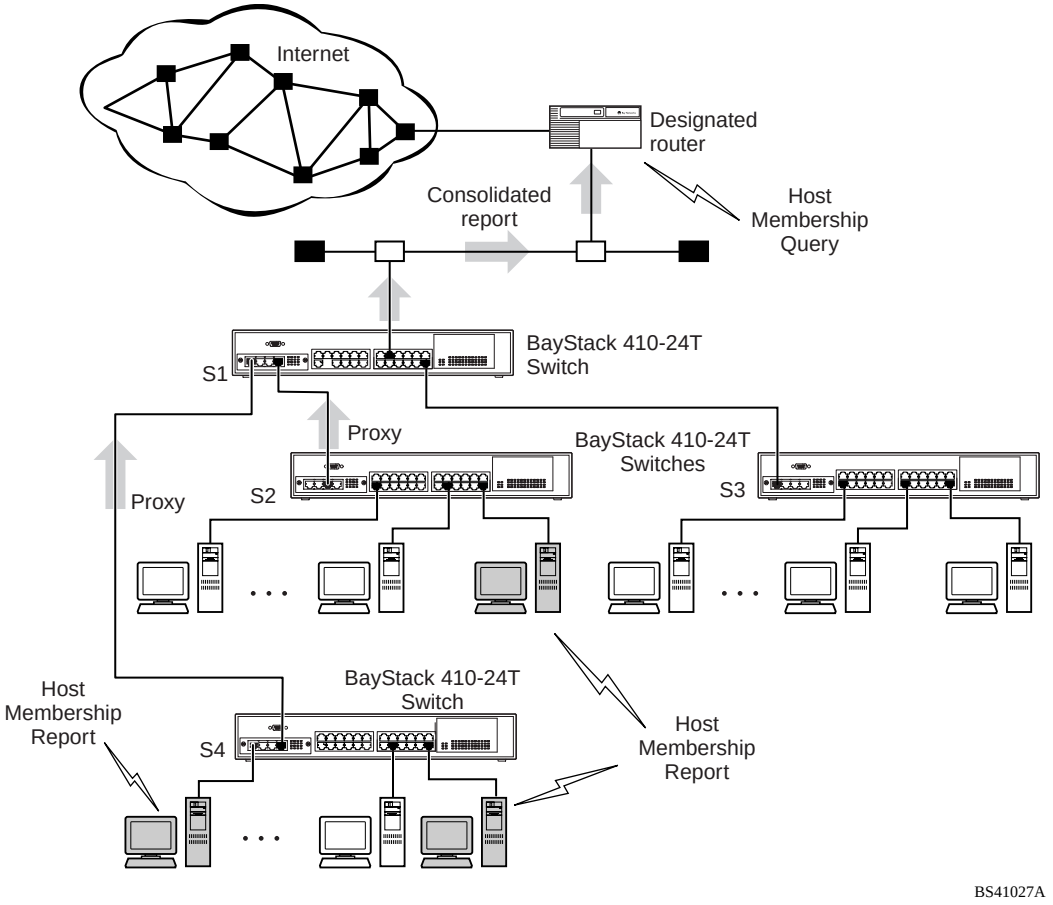


Figure 1-31. BayStack 410-24T Switch Filtering IP Multicast Streams (1 of 2)

Switch S1 treats the consolidated proxy reports from S2 and S4 as if they were reports from any client connected to its ports, and generates a consolidated proxy report to the designated router. In this way, the router receives a single consolidated report from that entire subnet.

After the switches learn which ports are requesting access to the IP Multicast stream, all other ports not responding to the queries are blocked from receiving the IP Multicast (see Figure 1-32).

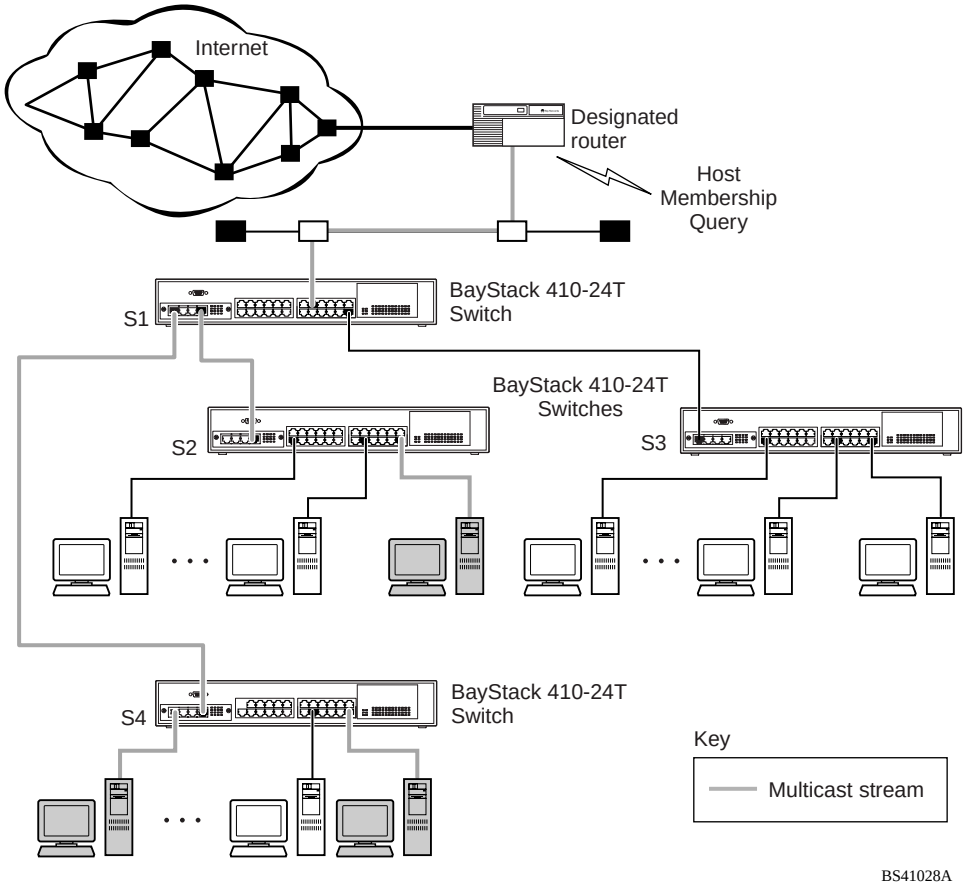


Figure 1-32. BayStack 410-24T Switch Filtering IP Multicast Streams (2 of 2)

The consolidated proxy report generated by the switch remains transparent to layer 3 of the International Organization for Standardization, Open Systems Interconnection (ISO/OSI) model. (The switch IP address and MAC address are not part of proxy report generation.) The last reporting IGMP group member in each VLAN represents all of the hosts in that VLAN and IGMP group.

IGMP Snooping Configuration Rules

The IGMP snooping feature operates according to specific configuration rules. When configuring your switch for IGMP snooping, consider the following rules that determine how the configuration reacts in any network topology:

- A port that is configured for port mirroring cannot be configured as a static router port.
- If a MultiLink Trunk member is configured as a static router port, all of the MultiLink Trunk members are configured as static router ports. Also, if a static router port is removed, and it is a MultiLink Trunk member, all MultiLink Trunk members are removed as static router port members, automatically.
- Static router ports must be port members of at least one VLAN.
- If a port is configured as a static router port, it is configured as a static router port for all VLANs on that port. The IGMP configuration is propagated through all VLANs of that port.
- If a static router port is removed, the membership for that port is removed from all VLANs of that port.
- The IGMP snooping feature is not STP dependent.
- The IGMP snooping feature is not rate-limiting dependent.
- The snooping field must be enabled for the proxy field to have any valid meaning.
- Static router ports are configured per VLAN and per IGMP Version.

Note: Because IGMP snooping is set up per VLAN, all IGMP changes are implemented according to the VLAN configuration for the specified ports.

For more information about using the IGMP snooping feature, see “IGMP Configuration Menu” on page 3-55.

See also Appendix C, “Quick Steps to Features” for configuration flowcharts that can help you use this feature.

IEEE 802.1p Prioritizing

You can use the VLAN Configuration screens to prioritize the order in which the switch forwards packets, on a per-port basis. For example, if messages from a specific segment are crucial to your operation, you can set the switch port connected to that segment to a higher priority level (by default, all switch ports are set to Low priority). Untagged packets received by the switch on that port are tagged according to the priority level you assign to the port (see Figure 1-33).

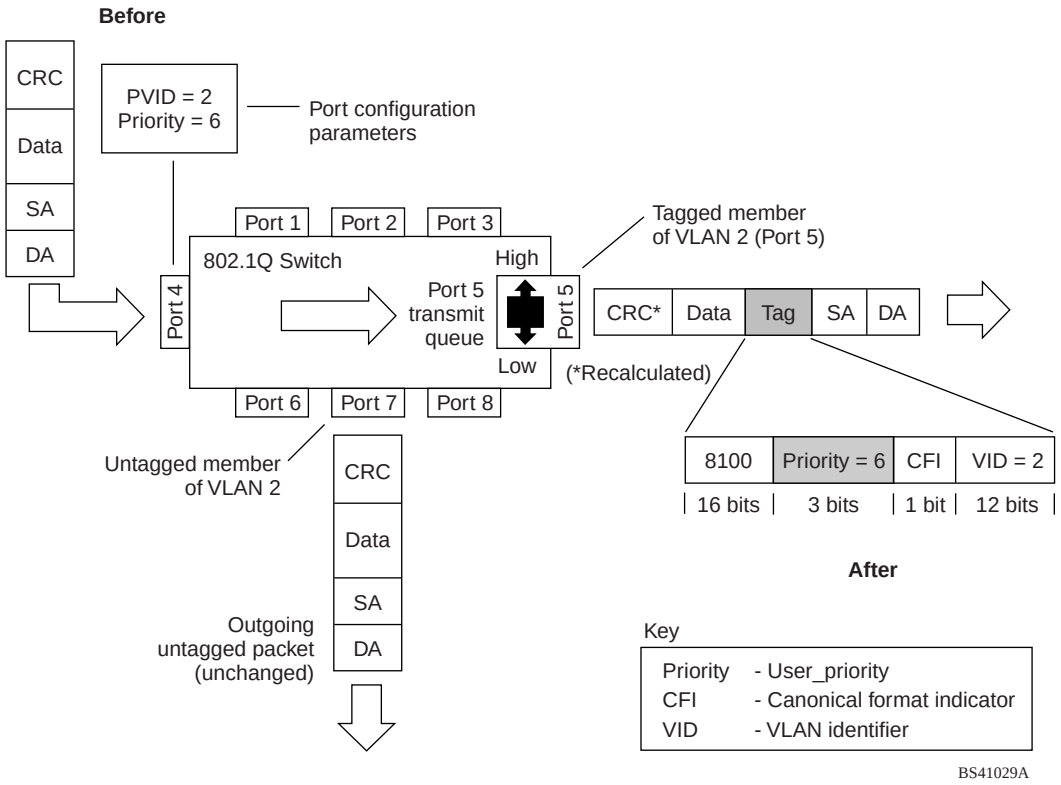


Figure 1-33. Prioritizing Packets

The newly tagged frame is read within the switch and sent to the port's high or low transmit queue for disposition (see Figure 1-34). The port transmit queue example shown in Figure 1-34 applies to all ports on the BayStack 410-24T switch.

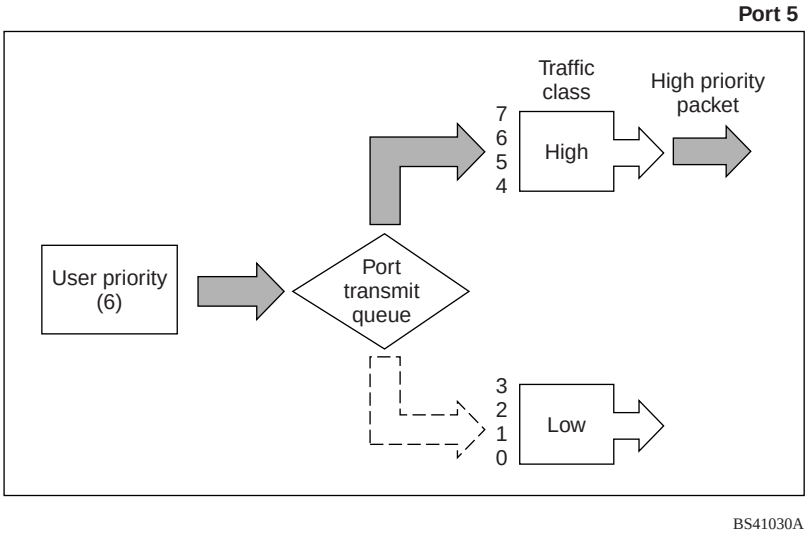


Figure 1-34. Port Transmit Queue

As shown in Figure 1-34, the switch provides two transmission queues, a *High* transmission queue and a *Low* transmission queue, for any given port. Frames are assigned to one of these queues on the basis of user_priority using a *traffic class table*. This table is managed by using the Traffic Class Configuration screen (Figure 1-35). The table indicates the corresponding traffic class that is assigned to the frame, for each possible user_priority value. If the frame leaves the switch formatted as a tagged packet, the traffic class assigned to the frame is carried forward to the next 802.1p capable switch. This allows the packet to carry the assigned traffic class priority through the network until it reaches its destination.

The following steps show how to use the Traffic Class Configuration screen to configure the port priority level shown in the example Figure 1-33.

For more information about using the Traffic Class Configuration screen, see “VLAN Configuration” on page 3-24.

To configure the port priority level, follow these steps:

1. **Determine the priority level you want to assign to the switch port.**

   User priority levels are assigned default settings in all BayStack 410-24T switches. The range is from 0 to 7. The traffic class table can be modified, therefore, view the settings shown in the Traffic Class Configuration screen before setting the port priority in the VLAN Port Configuration screen.

2. **Select Switch Configuration from the BayStack 410-24T switch Main Menu (or press w).**

3. **From the Switch Configuration Menu, select VLAN Configuration (or press v).**

4. **From the VLAN Configuration Menu, select Traffic Class Configuration (or press t).**

   The Traffic Class Configuration screen opens (Figure 1-35).

```
                    Traffic Class Configuration


          User Priority               Traffic Class
          -------------               -------------
           Priority 0:                    [ Low  ]
           Priority 1:                    [ Low  ]
           Priority 2:                    [ Low  ]
           Priority 3:                    [ Low  ]
           Priority 4:                    [ Low  ]
           Priority 5:                    [ Low  ]
           Priority 6:                    [ Low  ]
           Priority 7:                    [ Low  ]









Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-35. Default Traffic Class Configuration Screen Example

5. **Select a priority level from the range shown in the Traffic Class Configuration screen (or modify the Traffic Class parameters to suit your needs).**
6. **Assign the priority level to ports using the VLAN Port Configuration screen:**
   a. **Press [Ctrl]-R to return to the VLAN Configuration Menu.**
   b. **From the VLAN Configuration Menu, select VLAN Port Configuration (or press c).**

      The VLAN Port Configuration screen opens (Figure 1-36).

Figure 1-36 shows the VLAN Port Configuration screen setup for port 4 in Figure 1-33 on page 1-53.

```
                        VLAN Port Configuration


              Port:                          [  4  ]
              Filter Tagged Frames:          [ No  ]
              Filter Untagged Frames:        [ No  ]
              Filter Unregistered Frames:    [ No  ]
              Port Name:                     [ Luke's port ]
              PVID:                          [  2  ]
              Port Priority:                 [  6  ]









Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-36. Setting Port Priority Example

For more information about using this feature, see “VLAN Configuration Menu” on page 3-22.

MultiLink Trunks

MultiLink Trunks allow you to group up to four switch ports together to form a link to another switch or server, thus increasing aggregate throughput of the interconnection between the devices (up to 800 Mb/s in full-duplex mode with optional 100BASE-T/F MDAs installed). You can configure up to six MultiLink Trunks. The trunk members can reside on a single unit or on multiple units within the same stack configuration as a *distributed trunk*. MultiLink Trunking software detects misconfigured (or broken) trunk links and redirects traffic on the misconfigured or broken trunk link to other trunk members within that trunk.

You can use the Trunk Configuration screen to create switch-to-switch and switch-to-server MultiLink Trunk links (see Figure 1-37 and Figure 1-38).

Figure 1-37 shows two trunks (T1 and T2) connecting switch S1 to switches S2 and S3.

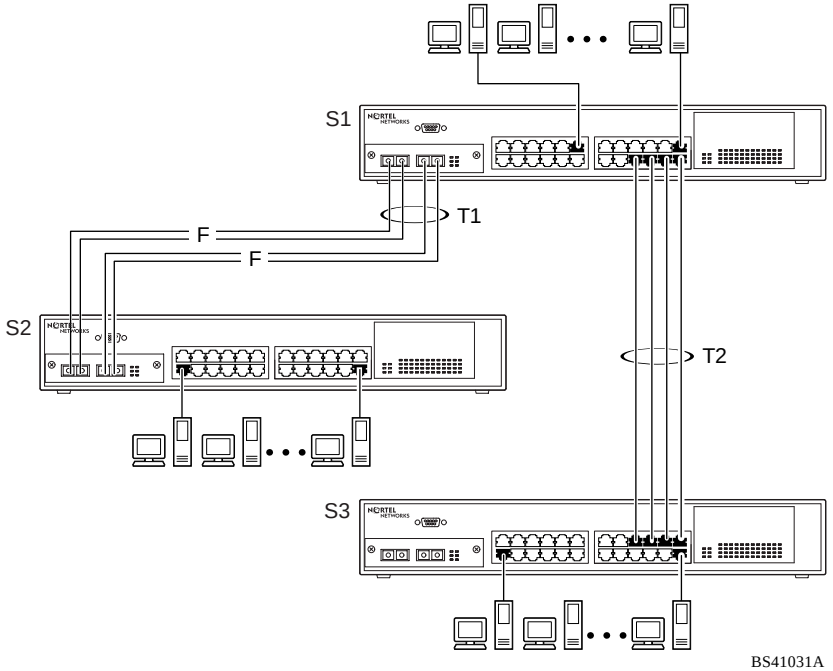


Figure 1-37. Switch-to-Switch Trunk Configuration Example

Each of the trunks shown in Figure 1-37 can be configured with up to four switch ports to provide maximum aggregate bandwidth through each trunk, in full-duplex mode. As shown in this example, when traffic between switch-to-switch connections approaches single port bandwidth limitations, creating a MultiLink Trunk can supply the additional bandwidth required to improve the performance.

Figure 1-38 shows a typical switch-to-server trunk configuration. In this example, file server FS1 uses dual MAC addresses, using one MAC address for each network interface controller (NIC). For this reason, FS1 does not require a trunk assignment. FS2 is a single MAC server (with a four-port NIC) and is set up as trunk configuration T1.

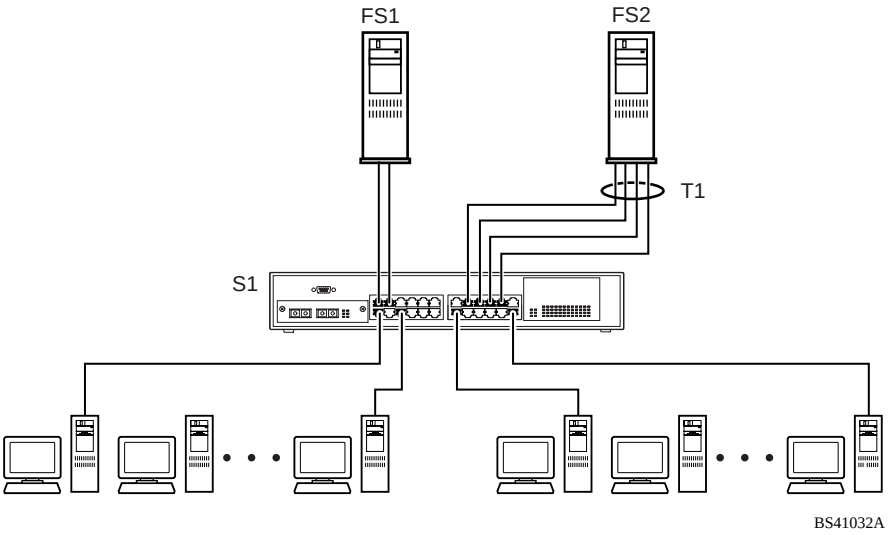


Figure 1-38. Switch-to-Server Trunk Configuration Example

Client/Server Configuration Using MultiLink Trunks

Figure 1-39 shows an example of how MultiLink Trunking can be used in a client/server configuration. In this example, both servers are connected directly to switch S1. FS2 is connected through a trunk configuration (T1). The switch-to-switch connections are through trunks (T2, T3, T4, and T5).

Clients accessing data from the servers (FS1 and FS2) are provided with maximized bandwidth through trunks T1, T2, T3, T4, and T5. Trunk members (the ports making up each trunk) do not have to be consecutive switch ports; they can be selected randomly, as shown by T5.

With spanning tree *enabled*, one of the trunks (T2 or T3) acts as a redundant (backup) trunk to switch S2. With spanning tree *disabled*, trunks T2 and T3 must be configured into separate VLANs for this configuration to function properly (see "IEEE 802.1Q VLAN Workgroups" on page 1-32).

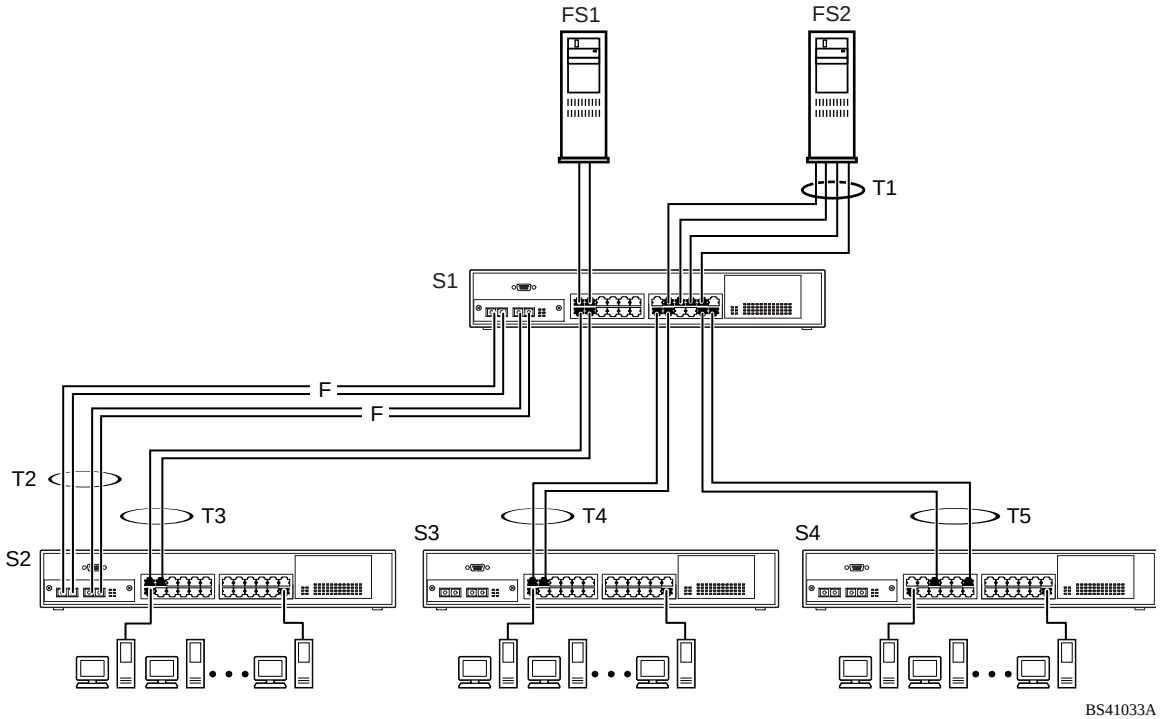


Figure 1-39. Client/Server Configuration Example

The trunk configuration screens for switches S1 to S4 are shown in "Trunk Configuration Screen Examples" following this section. For detailed information about configuring trunks, see "MultiLink Trunk Configuration" on page 3-41.

Trunk Configuration Screen Examples

This section shows examples of the MultiLink Trunk configuration screens for the client/server configuration example shown in Figure 1-39 on page 1-59. The screens show how you could set up the trunk configuration screens for switches S1 to S4. See "Spanning Tree Considerations for MultiLink Trunks" on page 1-72, and "MultiLink Trunk Configuration" on page 3-41 for more information.

Trunk Configuration Screen for Switch S1

Switch S1 is set up with five trunk configurations: T1, T2, T3, T4, and T5.

Setting up the Trunk Configuration for S1:

To set up the trunk configuration, choose MultiLink Trunk Configuration (or press t) from the MultiLink Trunk Configuration Menu screen (Figure 1-40).

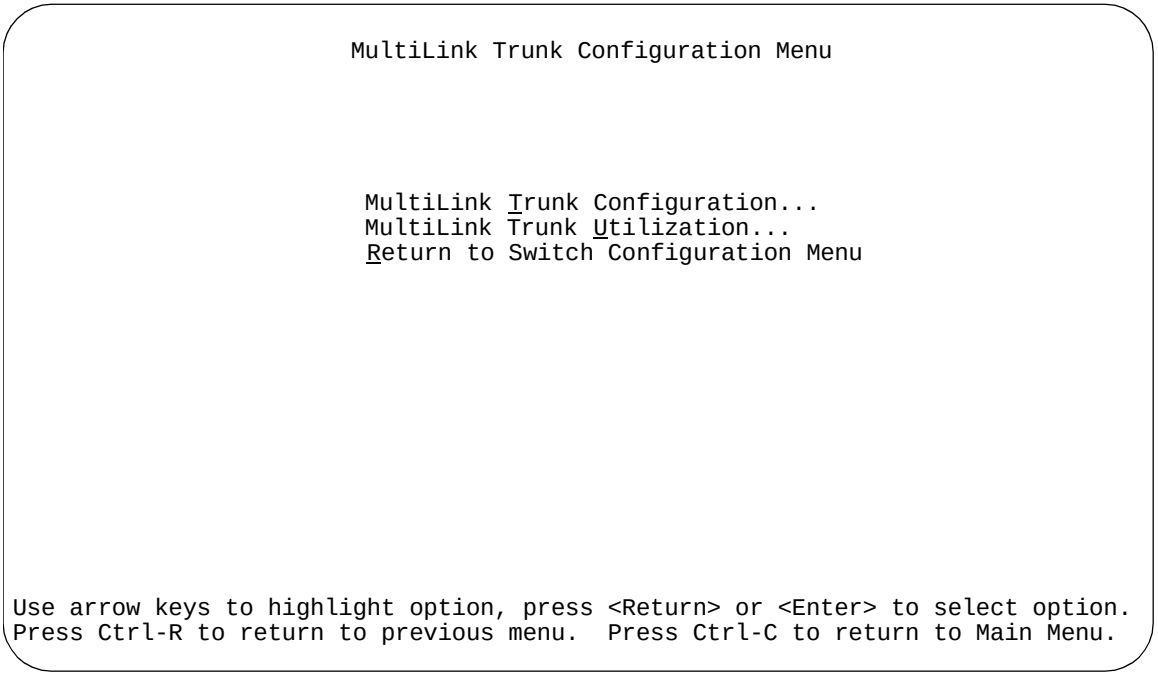

MultiLink Trunk Configuration Menu
MultiLink Trunk Configuration...
MultiLink Trunk Utilization...
Return to Switch Configuration Menu
Use arrow keys to highlight option, press <Return> or <Enter> to select option.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 1-40. Choosing the MultiLink Trunk Configuration Screen

The MultiLink Trunk Configuration screen opens (Figure 1-41).

```
                          MultiLink Trunk Configuration

Trunk   Trunk Members (Unit/Port)      STP Learning   Trunk Mode    Trunk Status
----- ------------------------------ ------------ --------------- ------------
  1   [  /15 ][  /17 ][  /19 ][  /21 ] [ Normal   ]      Basic      [ Enabled  ]
  2   [  /25 ][  /26 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  3   [  /2  ][  /4  ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  4   [  /14 ][  /16 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  5   [  /22 ][  /24 ][  /   ][  /   ] [ Fast     ]      Basic      [ Enabled  ]
  6   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]

Trunk     Trunk Name
----- ------------------
  1   [ S1:T1 to FS2 ]
  2   [ S1:T2 to S2  ]
  3   [ S1:T3 to S2  ]
  4   [ S1:T4 to S3  ]
  5   [ S1:T5 to S4  ]
  6   [ Trunk #6 ]


Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-41. MultiLink Trunk Configuration Screen for Switch S1

Switch S1 is configured as follows:

- **Trunk** (read only) indicates the trunks (1 to 6) that correspond to the switch ports specified in the Trunk Members fields.
- **Trunk Members (Unit/Port)** indicates the ports that can be configured, in each row, to create the corresponding trunk:

Note: The Unit value (in the Unit/Port field) cannot be configured when the switch is operating standalone. For detailed information about the MultiLink Trunk Configuration screen fields, see “MultiLink Trunk Configuration” on page 3-41.

-- Ports 15, 17, 19, and 21 are assigned as trunk members of trunk 1.

-- Ports 25 and 26 are assigned as trunk members of trunk 2.

-- Ports 2 and 4 are assigned as trunk members of trunk 3.

-- Ports 14 and 16 are assigned as trunk members of trunk 4.

-- Ports 22 and 24 are assigned as trunk members of trunk 5.

- **STP Learning** indicates the spanning tree participation setting for each of the trunks:

  -- Trunks 1 through 4 are enabled for Normal STP Learning.

  -- Trunk 5 is enabled for Fast STP Learning.

- **Trunk Mode** (read only) indicates the Trunk Mode for each of the trunks:

  The Trunk Mode field values for trunks 1 to 5 are set to Basic. Source MAC addresses are statically assigned to specific trunk members for flooding and forwarding. This allows the switch to stabilize and distribute the data streams of source addresses across the trunk members.

- **Trunk Status** indicates the Trunk Status for each of the trunks. When set to Enabled, the configuration settings for that specific trunk are activated.

- **Trunk Name** indicates optional fields for assigning names to the corresponding configured trunks.

  The names chosen for this example provide meaningful information to the user of this switch (for example, S1:T1 to FS2 indicates that Trunk 1, in switch S1, connects to File Server 2).

Trunk Configuration Screen for Switch S2

As shown in Figure 1-39 on page 1-59, switch S2 is set up with two trunk configurations (T2 and T3). Both trunks connect directly to switch S1.

As in the previous screen examples, to set up a trunk configuration choose MultiLink Trunk Configuration from the MultiLink Trunk Configuration Menu screen.

Figure 1-42 shows the MultiLink Trunk Configuration screen for switch S2.

```
                          MultiLink Trunk Configuration

Trunk   Trunk Members (Unit/Port)      STP Learning   Trunk Mode    Trunk Status
-----  ------------------------------ ------------ ---------------- ------------
  1   [  /25 ][  /26 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  2   [  /1  ][  /3  ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  3   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  4   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  5   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  6   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]

Trunk     Trunk Name
-----  ------------------
  1   [ S2:T2 to S1 ]
  2   [ S2:T3 to S1 ]
  3   [ Trunk #3 ]
  4   [ Trunk #4 ]
  5   [ Trunk #5 ]
  6   [ Trunk #6 ]



Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-42. MultiLink Trunk Configuration Screen for Switch S2

Switch S2 is configured as follows:

- **Trunk** (read only) indicates the trunks (1 to 6) that corresponds to the switch ports specified in the Trunk Members fields.
- **Trunk Members (Unit/Port)** indicates the ports that can be configured, in each row, to create the corresponding trunk:

  -- Ports 25 and 26 are assigned as trunk members of trunk 1.

-- Ports 1 and 3 are assigned as trunk members of trunk 2.

- **STP Learning** indicates the spanning tree participation setting for each of the trunks:

  Trunk 1 and 2 are enabled for Normal STP Learning.

- **Trunk Mode** (read only) indicates the Trunk Mode for each of the trunks:

  The Trunk Mode field values for trunks 1 and 2 are set to Basic. Source MAC addresses are statically assigned to specific trunk members for flooding and forwarding. This allows the switch to stabilize and distribute the data streams of source addresses across the trunk members.

- **Trunk Status** indicates the Trunk Status for each of the trunks. When set to Enabled, the configuration settings for that specific trunk are activated.

- **Trunk Name** indicates optional fields for assigning names to the corresponding configured trunks.

  The names chosen for this example provide meaningful information to the user of this switch (for example, S2:T2 to S1 indicates that Trunk 1, in switch S2, connects to Switch 1).

Trunk Configuration Screen for Switch S3

As shown in Figure 1-39 on page 1-59, switch S3 is set up with one trunk configuration (T4). This trunk connects directly to switch S1.

As in the previous screen examples, to set up an inter-switch trunk configuration choose MultiLink Trunk Configuration from the MultiLink Trunk Configuration Menu screen.

Figure 1-43 shows the MultiLink Trunk Configuration screen for switch S3.

```
                          MultiLink Trunk Configuration

Trunk   Trunk Members (Unit/Port)      STP Learning   Trunk Mode    Trunk Status
-----  ------------------------------ ------------ --------------- ------------
  1   [  /1  ][  /3  ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  2   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  3   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  4   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  5   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  6   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]

Trunk     Trunk Name
-----  ------------------
  1   [ S3:T4 to S1 ]
  2   [ Trunk #2 ]
  3   [ Trunk #3 ]
  4   [ Trunk #4 ]
  5   [ Trunk #5 ]
  6   [ Trunk #6 ]



Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-43. MultiLink Trunk Configuration Screen for Switch S3

Switch S3 is configured as follows:

- **Trunk** (read only) indicates the trunk (1 to 6) that corresponds to the switch ports specified in the Trunk Members fields.
- **Trunk Members (Unit/Port)** indicates the ports that can be configured, in each row, to create the corresponding trunk:

  Ports 1 and 3 are assigned as trunk members of trunk 1.

- **STP Learning** indicates the spanning tree participation setting for each of the trunks:

  Trunk 1 is enabled for Normal STP Learning.

- **Trunk Mode** (read only) indicates the Trunk Mode for each of the trunks:

  The Trunk Mode field value for trunk 1 is set to Basic. Source MAC addresses are statically assigned to specific trunk members for flooding and forwarding. This allows the switch to stabilize and distribute the data streams of source addresses across the trunk members.

- **Trunk Status** indicates the Trunk Status for each of the trunks. When set to Enabled, the configuration settings for that specific trunk are activated.

- **Trunk Name** indicates optional fields for assigning names to the corresponding configured trunks.

  The names chosen for this example provide meaningful information to the user of this switch (for example, S3:T4 to S1 indicates that Trunk 1, in switch S3, connects to Switch 1).

Trunk Configuration Screen for Switch S4

As shown in Figure 1-39, switch S4 is set up with one trunk configuration (T5). This trunk connects directly to switch S1.

As in the previous screen examples, to set up a trunk configuration choose MultiLink Trunk Configuration from the MultiLink Trunk Configuration Menu screen.

Figure 1-44 shows the MultiLink Trunk Configuration screen for switch S4.

```
                          MultiLink Trunk Configuration

Trunk   Trunk Members (Unit/Port)      STP Learning   Trunk Mode    Trunk Status
----- ------------------------------ ------------ --------------- ------------
  1   [  /5  ][  /11 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  2   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  3   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  4   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  5   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]
  6   [  /   ][  /   ][  /   ][  /   ] [ Normal   ]      Basic      [ Disabled ]

Trunk     Trunk Name
----- ------------------
  1   [ S4:T5 to S1 ]
  2   [ Trunk #2 ]
  3   [ Trunk #3 ]
  4   [ Trunk #4 ]
  5   [ Trunk #5 ]
  6   [ Trunk #6 ]



Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-44. MultiLink Trunk Configuration Screen for Switch S4

Switch S4 is configured as follows:

- **Trunk** (read only) indicates the trunk (1 to 6) that corresponds to the switch ports specified in the Trunk Members fields.
- **Trunk Members (Unit/Port)** indicates the ports that can be configured, in each row, to create the corresponding trunk:

  Ports 5 and 11 are assigned as trunk members of trunk T1.
- **STP Learning** indicates the spanning tree participation setting for each of the trunks:

  Trunk 1 is enabled for Normal STP Learning.
- **Trunk Mode** (read only) indicates the Trunk Mode for each of the trunks:

  The Trunk Mode field value for trunk 1 is set to Basic. Source MAC addresses are statically assigned to specific trunk members for flooding and forwarding. This allows the switch to stabilize and distribute the data streams of source addresses across the trunk members.
- **Trunk Status** indicates the Trunk Status for each of the trunks. When it is set to Enabled, the configuration settings for that specific trunk are activated.
- **Trunk Name** indicates optional fields for assigning names to the corresponding configured trunks.

  The names chosen for this example provide meaningful information to the user (for example, S4:T5 to S1 indicates that Trunk 1, in switch S4, connects to Switch 1).

Before Configuring Trunks

When you create and enable a trunk, the trunk members (switch ports) take on certain settings necessary for correct operation of the MultiLink Trunking feature. These settings, along with specific configuration rules, must be considered before configuring your MultiLink Trunk.

Before configuring any MultiLink Trunk:

1. **Read the configuration rules provided in the next section, "MultiLink Trunking Configuration Rules."**
2. **Determine which switch ports (up to four) are to become *trunk members* (the specific ports making up the trunk):**
   a. **A minimum of two ports are required for each trunk.**
   b. **Ensure that the chosen switch ports are set to Enabled, using the Port Configuration screen (see "Port Configuration" on page 3-36) or through network management.**
   c. **Trunk member ports must have the same VLAN configuration.**
3. **All network cabling should be complete and stable before configuring any trunks, to avoid configuration errors.**
4. **Consider how the existing spanning tree will react to the new trunk configuration (see "Spanning Tree Considerations for MultiLink Trunks" on page 1-72).**
5. **Consider how existing VLANs will be affected by the addition of a trunk.**
6. **After completing the above steps, see "MultiLink Trunk Configuration" on page 3-41 for screen examples and field descriptions that will help you configure your MultiLink Trunks.**

MultiLink Trunking Configuration Rules

The MultiLink Trunking feature is deterministic; that is, it operates according to specific configuration rules. When creating trunks, consider the following rules that determine how the MultiLink Trunk reacts in any network topology:

- Any port that participates in MultiLink Trunking must be an active port (set to Enabled via the Port Configuration screen or through network management).

- All trunk members must have the same VLAN configuration before the Trunk Configuration screen's Trunk Status field can be set to Enabled (see "VLAN Configuration" on page 3-24).
- When an active port is configured in a trunk, the port becomes a *trunk member* as soon as the Trunk Status field is set to Enabled. After the Trunk Status field is set to Enabled, the spanning tree parameters for the port will change to reflect the new trunk settings.
- If spanning tree participation of any trunk member is changed (enabled or disabled), the spanning tree participation of all members of that trunk is changed similarly (see "Spanning Tree Considerations for MultiLink Trunks" on page 1-72).
- When a trunk is enabled, the trunk spanning tree participation setting takes precedence over that of any trunk member. When a trunk is active, the trunk STP setting can be changed from either the Trunk Configuration screen or the Spanning Tree Configuration screen.
- If the VLAN settings of any trunk member are changed, the VLAN settings of all members of that trunk are changed similarly.
- When any trunk member is set to Disabled (not active) through the Port Configuration screen or through network management, the trunk member is removed from the trunk. The removed trunk member has to be reconfigured through the Trunk Configuration screen to rejoin the trunk. A screen prompt precedes this action. A trunk member cannot be disabled if there are only two trunk members on the trunk.
- A trunk member cannot be configured as a monitor port (see "Port Mirroring Configuration" on page 3-48).
- Trunks cannot be monitored by a monitor port; however, trunk members can be monitored (see "Port-Based Mirroring Configuration" on page 1-77).
- All trunk members must have identical IGMP configurations.
- If the IGMP snooping configuration for any trunk member is changed, the IGMP snooping settings for all trunk members are changed.

How the MultiLink Trunk Reacts to Losing Distributed Trunk Members

If your MultiLink Trunk (Figure 1-45) spans separate units in a stack configuration and any of those units (or trunked MDAs) becomes inactive from a loss of power or unit failure, the unaffected trunk members remain operational.

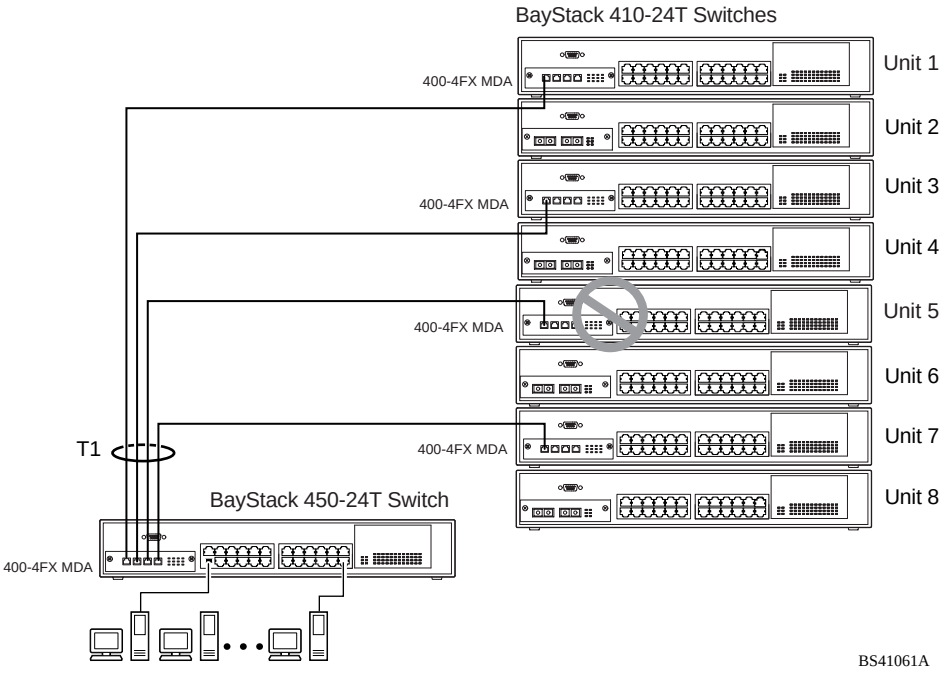


Figure 1-45. Loss of Distributed Trunk Members

However, until you correct the cause of the failure or change the trunk Status field to Disabled, you will be unable to modify any of the following parameters for the affected trunk:

- VLAN Configuration
- Spanning Tree Configuration
- Port Mirroring Configuration
- Port Configuration
- IGMP Configuration
- Rate Limiting Configuration

Spanning Tree Considerations for MultiLink Trunks

The spanning tree Path Cost parameter is recalculated based on the aggregate bandwidth of the trunk. For example, Figure 1-46 shows a four-port trunk (T1) with two port members operating at 100 Mb/s and two at 10 Mb/s. Trunk T1 provides an aggregate bandwidth of 220 Mb/s. The Path Cost for T1 is 4 (Path Cost = 1000/LAN speed, in Mb/s). Another three-port trunk (T2) is configured with an aggregate bandwidth of 210 Mb/s and a comparable Path Cost of 4. When the Path Cost calculations for both trunks are equal, the software chooses the trunk with the larger aggregate bandwidth (T1) to determine the most efficient path.

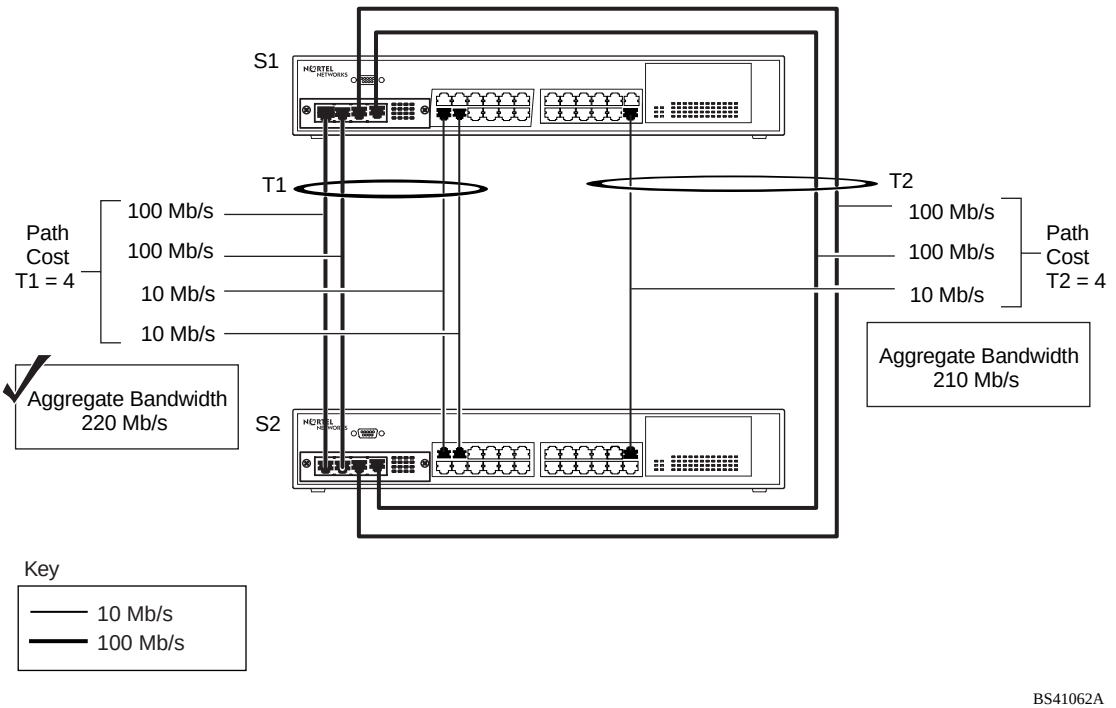


Figure 1-46. Path Cost Arbitration Example

The switch can also detect trunk member ports that are physically misconfigured. For example, in Figure 1-47, trunk member ports 2, 4, and 6 of switch S1 are configured *correctly* to trunk member ports 7, 9, and 11 of switch S2. The Spanning Tree Port Configuration screen for each switch shows the port state field for each port in the Forwarding state.

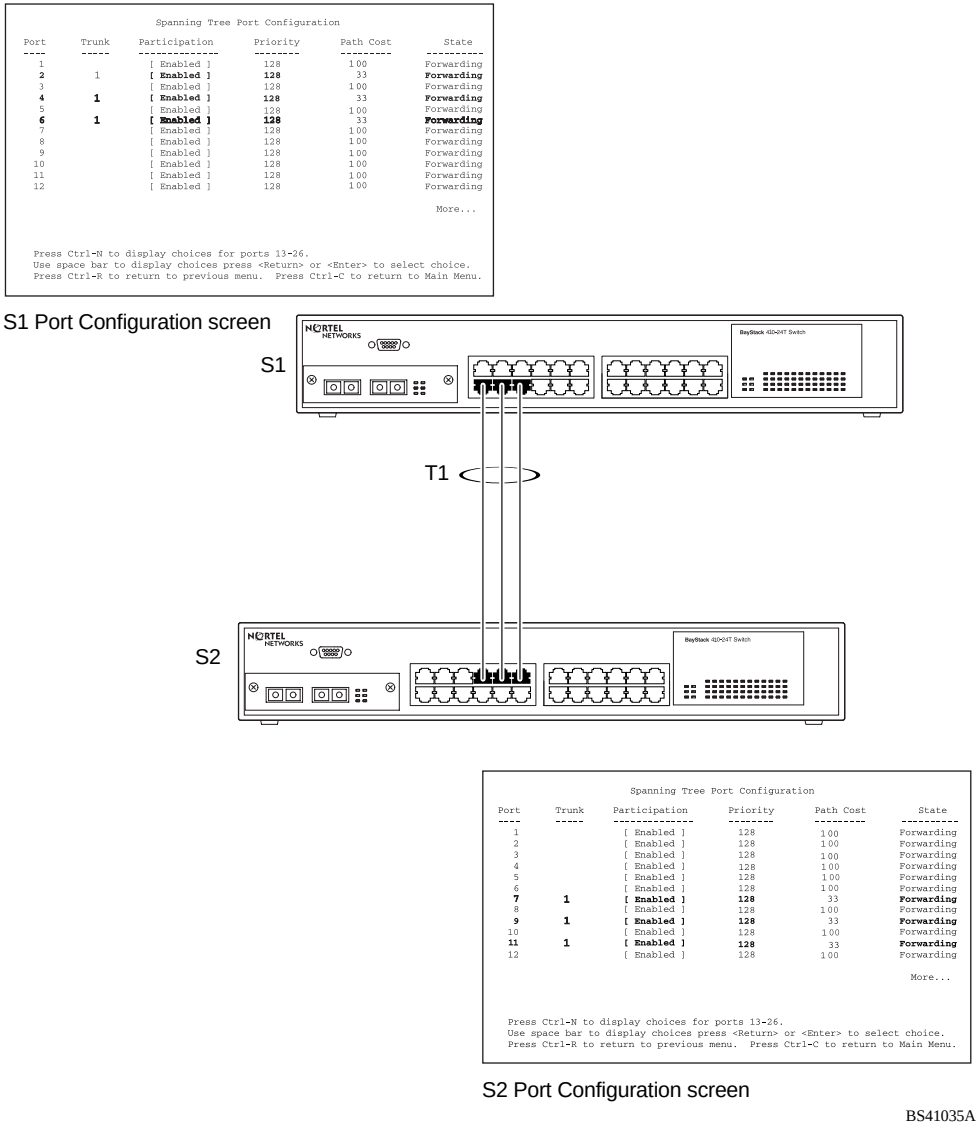

Spanning Tree Port Configuration
Port Trunk Participation Priority Path Cost State
1 [Enabled] 128 100 Forwarding
2 1 [Enabled] 128 33 Forwarding
3 [Enabled] 128 100 Forwarding
4 1 [Enabled] 128 33 Forwarding
5 [Enabled] 128 100 Forwarding
6 1 [Enabled] 128 33 Forwarding
7 [Enabled] 128 100 Forwarding
8 [Enabled] 128 100 Forwarding
9 [Enabled] 128 100 Forwarding
10 [Enabled] 128 100 Forwarding
11 [Enabled] 128 100 Forwarding
12 [Enabled] 128 100 Forwarding
More...
Press Ctrl-N to display choices for ports 13-26.
Use space bar to display choices press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.
S1 Port Configuration screen
S1
T1
S2
Spanning Tree Port Configuration
Port Trunk Participation Priority Path Cost State
1 [Enabled] 128 100 Forwarding
2 [Enabled] 128 100 Forwarding
3 [Enabled] 128 100 Forwarding
4 [Enabled] 128 100 Forwarding
5 [Enabled] 128 100 Forwarding
6 [Enabled] 128 100 Forwarding
7 1 [Enabled] 128 33 Forwarding
8 [Enabled] 128 100 Forwarding
9 1 [Enabled] 128 33 Forwarding
10 [Enabled] 128 100 Forwarding
11 1 [Enabled] 128 33 Forwarding
12 [Enabled] 128 100 Forwarding
More...
Press Ctrl-N to display choices for ports 13-26.
Use space bar to display choices press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.
S2 Port Configuration screen
BS41035A

Figure 1-47. Example 1: Correctly Configured Trunk

If switch S2's trunk member port 11 is physically disconnected and then reconnected to port 13, the Spanning Tree Port Configuration screen for switch S1 changes to show port 6 in the Blocking state (Figure 1-48).

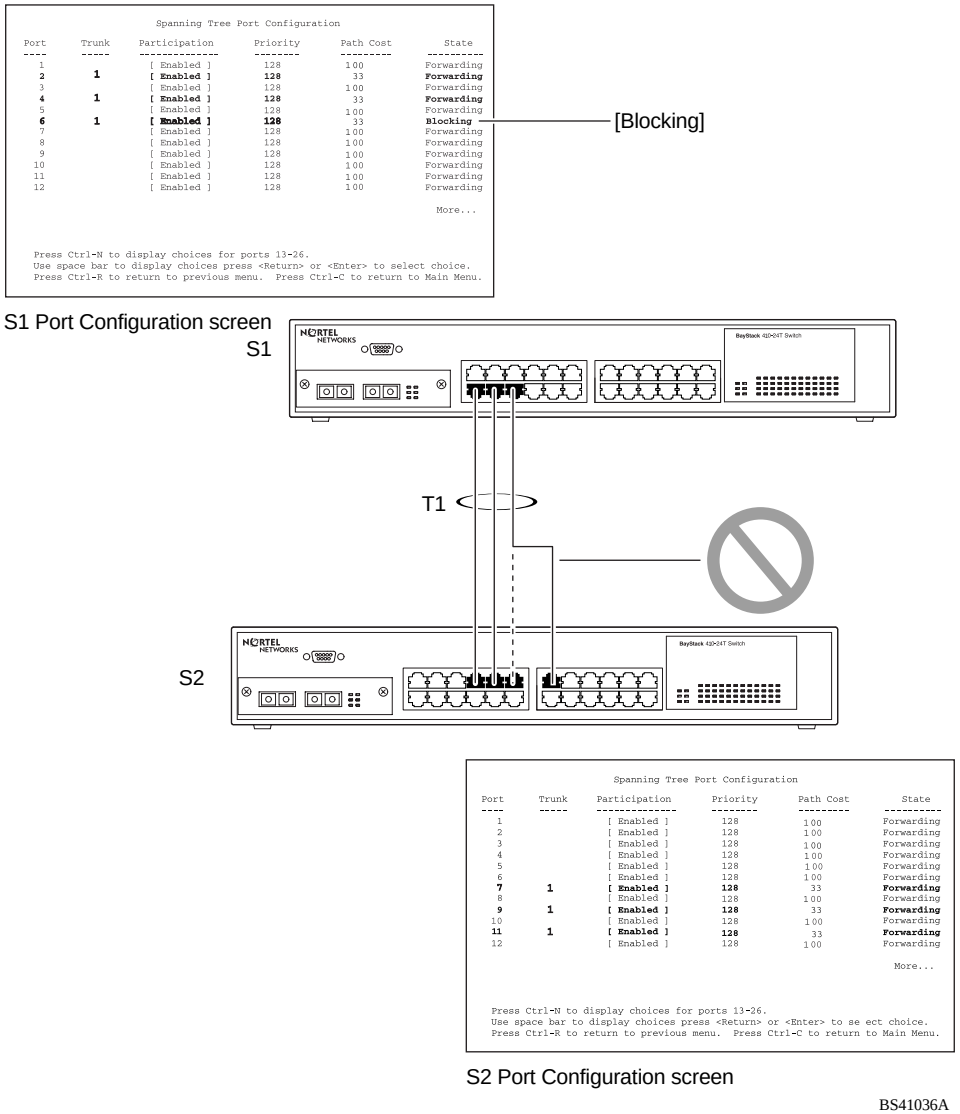

Spanning Tree Port Configuration
Port Trunk Participation Priority Path Cost State
1 [Enabled] 128 100 Forwarding
2 1 [Enabled] 128 33 Forwarding
3 [Enabled] 128 100 Forwarding
4 1 [Enabled] 128 33 Forwarding
5 [Enabled] 128 100 Forwarding
6 1 [Enabled] 128 33 Blocking
7 [Enabled] 128 100 Forwarding
8 [Enabled] 128 100 Forwarding
9 [Enabled] 128 100 Forwarding
10 [Enabled] 128 100 Forwarding
11 [Enabled] 128 100 Forwarding
12 [Enabled] 128 100 Forwarding
More...
Press Ctrl-N to display choices for ports 13-26.
Use space bar to display choices press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.
[Blocking]
S1 Port Configuration screen
S1
T1
S2
Spanning Tree Port Configuration
Port Trunk Participation Priority Path Cost State
1 [Enabled] 128 100 Forwarding
2 [Enabled] 128 100 Forwarding
3 [Enabled] 128 100 Forwarding
4 [Enabled] 128 100 Forwarding
5 [Enabled] 128 100 Forwarding
6 [Enabled] 128 100 Forwarding
7 1 [Enabled] 128 33 Forwarding
8 [Enabled] 128 100 Forwarding
9 1 [Enabled] 128 33 Forwarding
10 [Enabled] 128 100 Forwarding
11 1 [Enabled] 128 33 Forwarding
12 [Enabled] 128 100 Forwarding
More...
Press Ctrl-N to display choices for ports 13-26.
Use space bar to display choices press <Return> or <Enter> to se ect choice.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.
S2 Port Configuration screen
BS41036A

Figure 1-48. Example 2: Detecting a Misconfigured Port

Additional Tips About the MultiLink Trunking Feature

When you create a MultiLink Trunk, the individual trunk members (the specific ports that make up the trunk) are logically connected and react as a single entity. For example, if you change spanning tree parameters for *any* trunk member, the spanning tree parameters for *all* trunk members are changed.

All configured trunks are indicated in the Spanning Tree Configuration screen. The screen's Trunk field lists the active trunks, adjacent to the port numbers that correspond to the specific trunk member for that trunk.

When a trunk is active you can disable spanning tree participation using the Trunk Configuration screen or using the Spanning Tree Configuration screen.

When a trunk is not active, the spanning tree participation setting in the Trunk Configuration screen does not take effect until the Trunk Status field is set to Enabled.

The trunk is also viewed by management stations as a single spanning tree port. The spanning tree port is represented by the trunk member with the lowest port number. For example, if ports 13, 14, 15, and 16 are trunk members of trunk T1, the management station views trunk T1 as spanning tree port 13.

For more information about using the MultiLink Trunking feature, see "MultiLink Trunk Configuration" on page 3-41.

See also Appendix C, "Quick Steps to Features," for configuration flowcharts that can help you use this feature.

Port Mirroring (Conversation Steering)

You can designate one of your switch ports to monitor traffic on any two specified switch ports (port-based) or to monitor traffic to or from any two specified addresses that the switch has learned (address-based).

Note: A probe device, such as the Nortel Networks StackProbe™ or equivalent, must be connected to the designated monitor port to use this feature (contact your Nortel Networks sales agent for details about the StackProbe).

The following sections provide example configurations for both monitoring modes available with the port mirroring feature:

- Port-based mirroring
- Address-based mirroring

A sample of the Port Mirroring Configuration screen is provided with each of the examples to support the network configuration example.

Note that in the following examples, the displayed screens do not show all of the screen prompts that precede some actions. For example, when you configure a switch for port mirroring or when you modify an existing port mirroring configuration, the new configuration does not take effect until you respond [Yes] to the following screen prompt:

```
Is your port mirroring configuration complete?     [ Yes ]
```

Port-Based Mirroring Configuration

Figure 1-49 shows an example of a port-based mirroring configuration where port 23 is designated as the monitor port for ports 24 and 25 of switch S1. Although this example shows ports 24 and 25 monitored by the monitor port (port 23), any of the trunk members of T1 and T2 can also be monitored.

Note: Trunks cannot be monitored and trunk members cannot be configured as monitor ports (see "MultiLink Trunking Configuration Rules" on page 1-69).

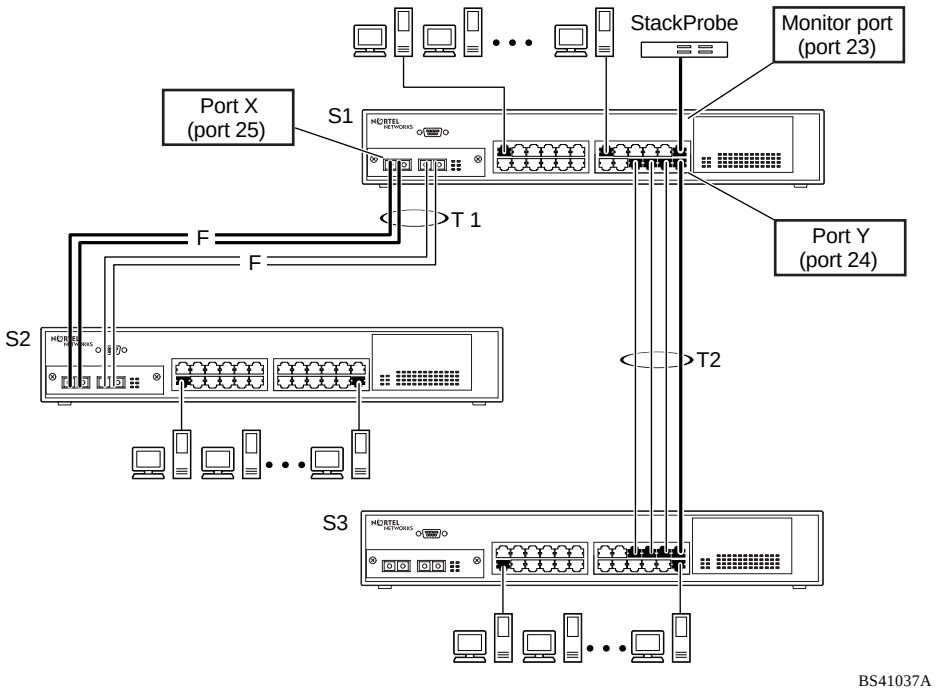


Figure 1-49. Port-Based Mirroring Configuration Example

Figure 1-50 shows the Port Mirroring Configuration screen setup for this example.

In the configuration example shown in Figure 1-49, the designated monitor port (port 23) can be set to monitor traffic in any of the following modes:

- Monitor all traffic received by port X.
- Monitor all traffic transmitted by port X.
- Monitor all traffic received and transmitted by port X.
- Monitor all traffic received by port X or transmitted by port Y.
- Monitor all traffic received by port X (destined to port Y) and then transmitted by port Y.
- Monitor all traffic received/transmitted by port X and received/transmitted by port Y (conversations between port X and port Y).

As shown in the Port Mirroring Configuration screen example (Figure 1-50), port 23 is designated as the Monitor Port for ports 24 and 25 in switch S1.

Note: The Unit value (in the Unit/Port field) cannot be configured when the switch is operating standalone.

The Monitoring Mode field [- > Port X or Port Y - >] indicates that all traffic received by port X *or* all traffic transmitted by port Y is currently being monitored by the StackProbe attached to Monitor port 23.

The screen data displayed at the bottom of the screen shows the currently active port mirroring configuration.

```
                        Port Mirroring Configuration


                     Monitoring Mode:  [  -> Port X   or    Port Y ->  ]
                   Monitor Unit/Port:  [  /23 ]

                          Unit/Port X:  [  /25 ]
                          Unit/Port Y:  [  /24 ]

                            Address A:  [ 00-00-00-00-00-00 ]
                            Address B:  [ 00-00-00-00-00-00 ]



Port mirroring configuration has taken effect.

                  Currently Active Port Mirroring Configuration
                  ---------------------------------------------
Monitoring Mode:  -> Port X   or    Port Y ->    Monitor Port: 23
Port X: 25     Port Y: 24

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-50. Port Mirroring Port-Based Screen Example

Address-Based Mirroring Configuration

Figure 1-51 shows an example of an address-based mirroring configuration where port 23, the designated monitor port for switch S1, is monitoring traffic occurring between address A and address B.

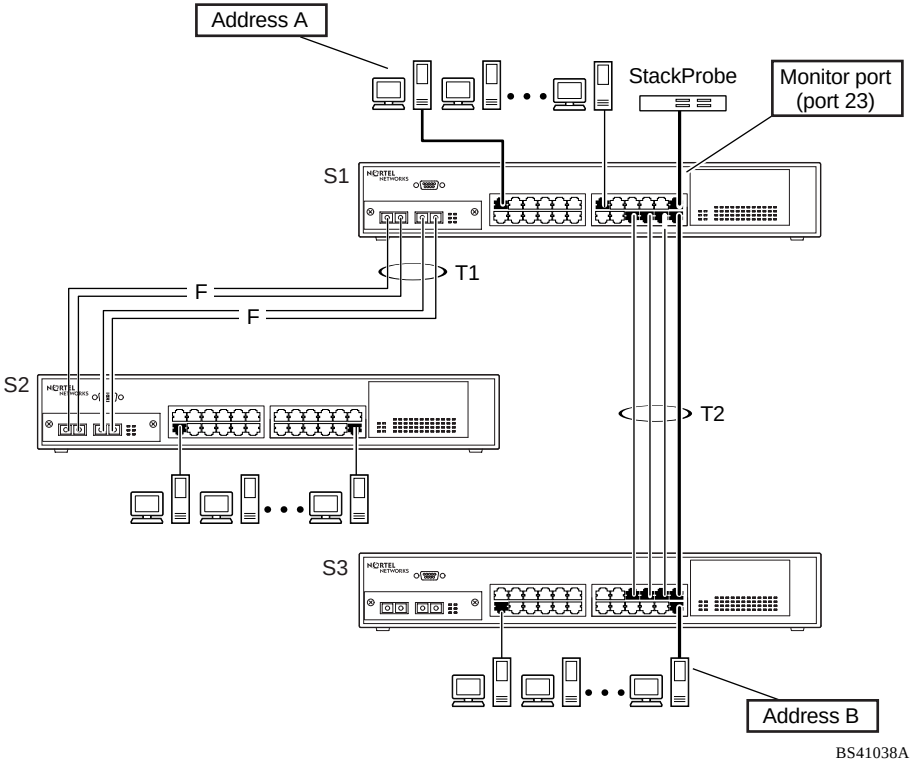


Figure 1-51. Address-Based Mirroring Configuration Example

In this configuration, the designated monitor port (port 23) can be set to monitor traffic in any of the following modes:

- Monitor all traffic transmitted from address A to any address.
- Monitor all traffic received by address A from any address.
- Monitor all traffic received by or transmitted by address A.
- Monitor all traffic transmitted by address A to address B.
- Monitor all traffic between address A and address B (conversation between the two stations).

Figure 1-52 shows the Port Mirroring Configuration screen setup for this example.

In this example, port 23 becomes the designated Monitor Port for switch S1 when you press Enter in response to the [Yes] screen prompt.

Note: The screen data displayed at the bottom of the screen changes to show the *new* currently active port mirroring configuration *after* you press Enter.

The Monitoring Mode field [Address A - > Address B] indicates that all traffic transmitted by address A to address B will be monitored by the StackProbe attached to Monitor port 23.

Note: When you enter MAC addresses in this screen, they are also displayed in the MAC Address Table screen (see "MAC Address Table" on page 3-19).

```
                      Port Mirroring Configuration


                    Monitoring Mode:  [  Address A    ->   Address B  ]
                  Monitor Unit/Port:  [  /23 ]

                        Unit/Port X:  [  /   ]
                        Unit/Port Y:  [  /   ]

                          Address A:  [ 00-44-55-44-55-22 ]
                          Address B:  [ 00-33-44-33-22-44 ]

Is your port mirroring configuration complete?   [ Yes ]




                 Currently Active Port Mirroring Configuration
                 ---------------------------------------------
Monitoring Mode:  -> Port X   or    Port Y ->    Monitor Port: 23
Port X: 25     Port Y: 24

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 1-52. Port Mirroring Address-Based Screen Example

Port Mirroring Configuration Rules

The following configuration rules apply to any port mirroring configuration:

- A monitor port cannot be configured as a trunk member or IGMP member, and cannot be used for normal switch functions.
- When a port is configured and enabled as a monitor port, the port is automatically disabled from participating in the spanning tree. When the port is reconfigured as a standard switch port (no longer a monitor port), the port becomes enabled for spanning tree participation.
- When creating a *port-based* port mirroring configuration, be sure that the monitor port and both of the mirrored ports, port X and port Y, have the same configuration. Use the VLAN Configuration screen to configure the VLAN (see "VLAN Configuration" on page 3-24).
- VLAN configuration settings for any ports configured for port-based mirroring cannot be changed. Use the Port Mirroring Configuration screen to disable port mirroring (or reconfigure the port mirroring ports), then change the VLAN configuration settings.
- For port-based monitoring of traffic, use one of the following modes for monitoring broadcast, IP Multicast, or unknown DA frames:

  -- Monitor all traffic received by port X.

  -- Monitor all traffic transmitted by port X.

  -- Monitor all traffic received and transmitted by port X.

For more information about using the Port Mirroring feature, see "Port Mirroring Configuration" on page 3-48.

See also Appendix C, "Quick Steps to Features" for configuration flowcharts that can help you use this feature.

Chapter 2
Installing the BayStack 410-24T Switch

This chapter covers the following topics:

- Installation requirements
- Installation procedure
- Instructions for connecting power
- Instructions for verifying the installation
- Instructions for the initial (standalone) switch setup
- Instructions for the initial stack setup

Refer to Chapter 3, “Using the Console Interface,” to further configure your BayStack 410-24T switch.

Installation Requirements

Before installing the BayStack 410-24T switch, verify that the package contains the following items in addition to this guide (see Figure 2-1).

Note: Be sure that the supplied AC power cord matches the requirements for your region; see “AC Power Receptacle” on page 1-7.

Install the BayStack 410-24T switch in a ventilated area that is dust free and away from heat vents, warm air exhaust from other equipment, and direct sunlight. Avoid proximity to large electric motors or other electromagnetic equipment. When choosing a location, observe the environmental guidelines listed in Appendix A, “Technical Specifications.” You will need a Phillips screwdriver for the installation.

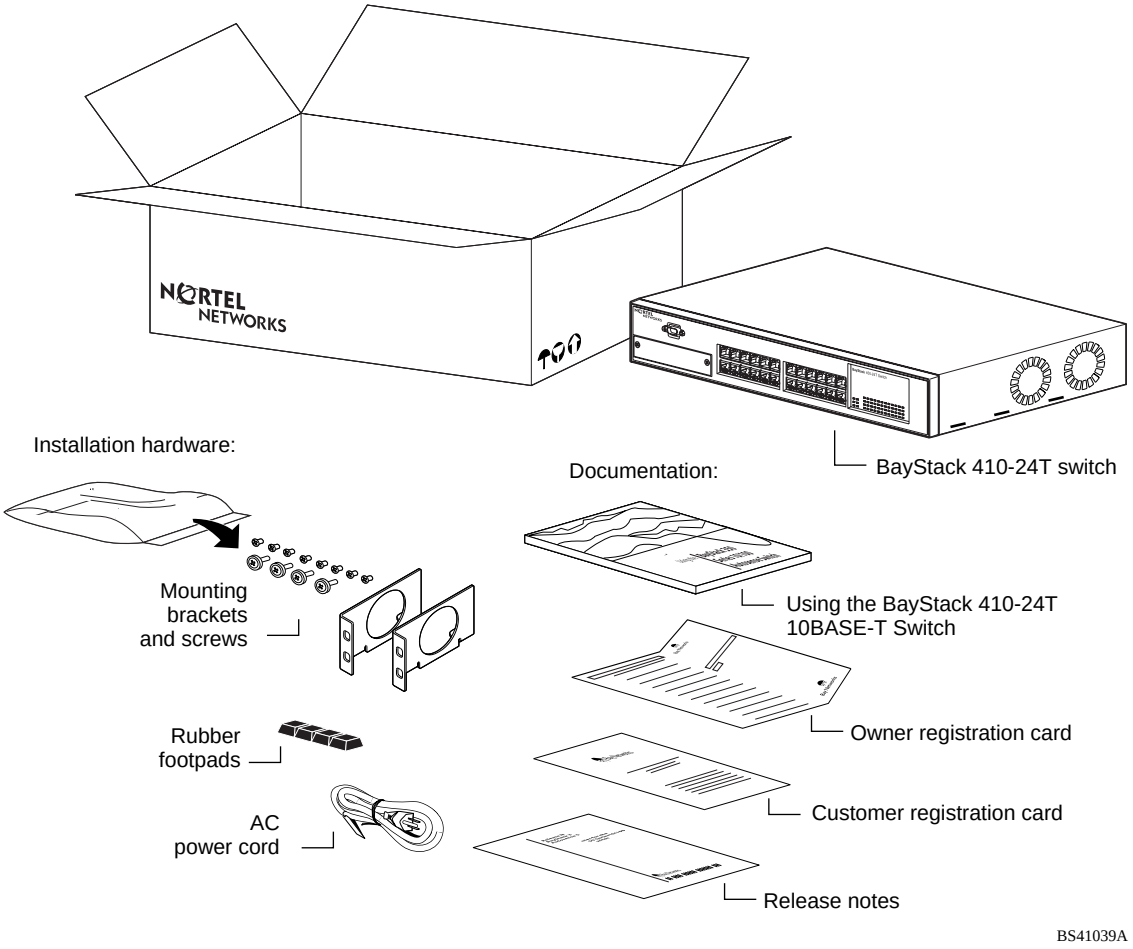


Figure 2-1. Package Contents

Note: Your shipping box may be configured differently than shown in the above example; the contents will be the same.

The number of boxes and their contents depends on the options you ordered. Open any accessories box and verify that the contents agree with your bill of materials. If any items are missing or damaged, contact the sales agent or the customer service representative from whom you purchased the BayStack 410-24T switch.

Installation Procedure

This section provides the requirements and instructions for installing the BayStack 410-24T switch on a flat surface or in a standard 19-inch utility rack. If you install the switch in a rack, ground the rack to the same grounding electrode used by the power service in the area. The ground path must be permanent and must not exceed 1 ohm of resistance from the rack to the grounding electrode.

Installing the BayStack 410-24T Switch on a Flat Surface

Caution: When this device is installed in a stack on a shelf or tabletop, the accumulated weight of the port cables increases with the height of the shelf or tabletop.

Achtung: Wenn dieses Gerät in einem Stapel auf einem Tisch oder einem Regalboden installiert wird, erhöht sich das Gesamtgewicht der Schnittstellenkabel mit der Höhe des Regalbodens oder Tisches.

Attention: Si l'appareil est posé dans un rack ou sur une étagère, notez bien que le poids du câblage réseau augmente avec la hauteur de l'installation.

Precaución: Cuando este dispositivo se instala apilado en un estante o sobre una mesa, el peso acumulado de los cables de los puertos aumenta según la altura del estante o de la mesa.

Attenzione: Quando il dispositivo viene installato in stack su un ripiano o su un tavolo, il peso dei cavi connessi alle porte aumenta in proporzione all'altezza del ripiano o del tavolo.

注意：このディバイスを棚や台のスタックにインストールする場合、棚や台が高くなるにつれて、ポート・ケーブルの総重量が増します。

The BayStack 410-24T switch can be mounted onto any appropriate flat, level surface that can safely support the weight of the switch and its attached cables, as long as there is adequate space around the unit for ventilation and access to cable connectors.

To install the switch on a tabletop, shelf, or any other flat surface:

1. **Set the switch on the flat surface and check for proper ventilation.**

   Allow at least 2 inches (5.1 cm) on each side for proper ventilation and 5 inches (12.7 cm) at the back for power cord clearance.

2. **Attach rubber feet to each marked location on the bottom of the chassis.**

   The rubber feet are optional but recommended to keep the unit from slipping.

3. **Attach all devices to the ports.**

   See "Attaching Devices to the BayStack 410-24T Switch" on page 2-7.

Installing the BayStack 410-24T Switch in a Rack

Caution: When mounting this device in a rack, do not stack units directly on top of one another in the rack. Each unit must be secured to the rack with appropriate mounting brackets. Mounting brackets are not designed to support multiple units.

Achtung: Wenn Sie dieses Gerät in einem Gerätegestell installieren, stellen Sie die Geräte nicht direkt aufeinander. Jedes Gerät muß mit entsprechenden Halterungen im Gestell befestigt werden. Die Halterungen sind nicht dafür konzipiert, mehrere Geräte zu tragen.

Attention: Si cet appareil doit être encastré dans un rack, ne jamais empiler directement plusieurs unités les unes sur les autres. Chaque unité doit être correctement fixée avec les membrures appropriées. Les membrures ne sont pas conçues pour supporter le poids d'unités multiples.

Precaución: Al montar este dispositivo apilado con otros dispositivos, no apile las unidades directamente unas sobre otras. Cada unidad se debe fijar a la estructura mediante los soportes de montaje adecuados. Los soportes de montaje no están diseñados para soportar varias unidades.

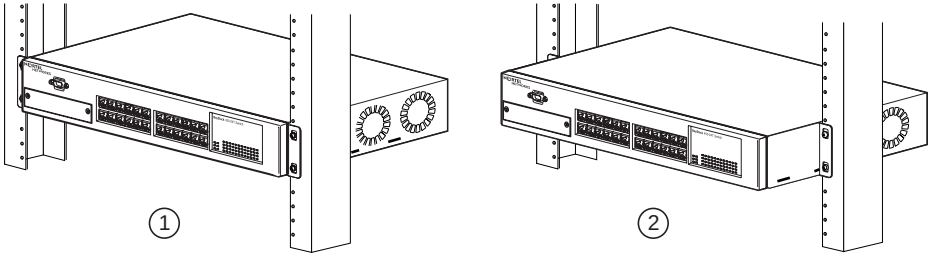
Attenzione: Se il dispositivo viene installato su una cremagliera, non impilarlo su un altro dispositivo montato sulla cremagliera. Ciascuna unità deve essere fissata alla cremagliera con le apposite staffe di montaggio. Tali staffe non possono essere utilizzate per fissare più unità.

注意：このディバイスをラックに据え付ける場合、スタック・ユニットを別のユニットの上に直接積み重ねないでください。各ユニットは、適切な据え付けブラケットでラックに固定してください。据え付けブラケットは、複数のユニットを支えるように設計されていません。

The BayStack 410-24T switch occupies a 1.6-unit (1.6u) rack space and can be installed in most standard 19-inch racks. Ground the rack to the same grounding electrode used by the power service in the area. The permanent ground path must not exceed 1 ohm of resistance from the rack to the grounding electrode.

To install the BayStack 410-24T switch in a rack:

1. **Determine how far you want the switch to protrude in front of the rack (Figure 2-2).**



1 = Flush with rack
2 = Extended from rack

BS41040A

Figure 2-2. Positioning the Chassis in the Rack

There are three slots located on the sides of the chassis. You can install the switch flush to the rack or extended from the rack, depending on how you install the mounting brackets.

2. **Attach a mounting bracket to each side of the switch using the supplied screws (inserted from the bottom of the chassis, see Figure 2-3).**

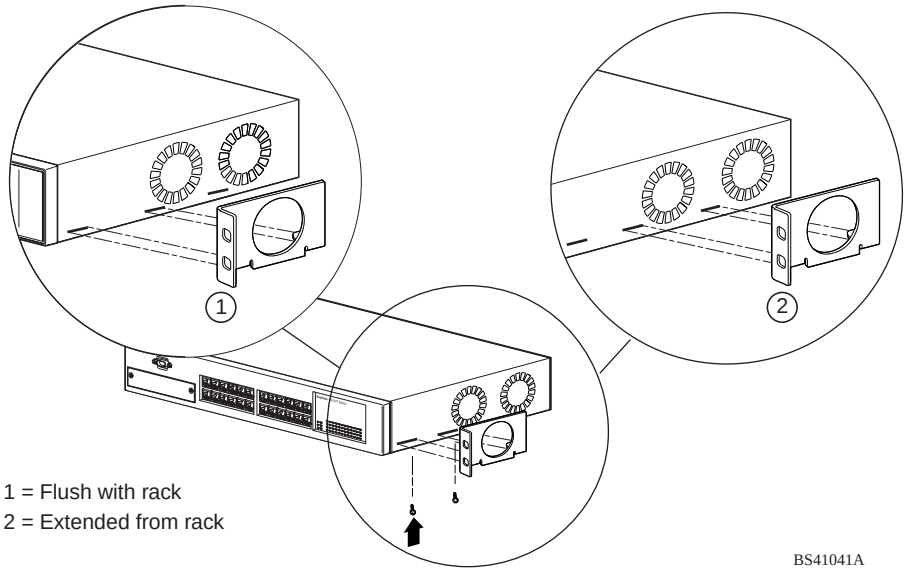


Figure 2-3. Attaching Mounting Brackets

3. **Position the switch in the rack and align the holes in the mounting bracket with the holes in the rack (see Figure 2-4).**

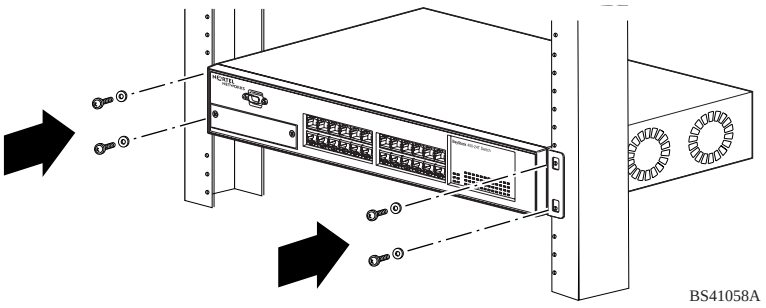


Figure 2-4. Installing the Switch in an Equipment Rack

4. **Insert two screws, appropriate for your 19-inch rack, into each of the mounting brackets and tighten.**
5. **After the switch is secured in the rack, proceed to the next section, "Attaching Devices to the BayStack 410-24T Switch."**

Attaching Devices to the BayStack 410-24T Switch

This section describes how to attach devices to the BayStack 410-24T switch ports and how to connect a console terminal to the switch Console/Comm port. You can use the console terminal to observe the power on self-test results and set up the switch, if required, as described later in this chapter.

The BayStack 410-24T switch has an Uplink/Expansion slot that allows you to attach optional media dependent adapters (MDAs). The MDAs support a range of media types (see Appendix B, "Media Dependent Adapters" for more information about MDA types available from Nortel Networks). Refer to the documentation that came with your specific MDA for information about its cabling and LED indications.

BayStack 410-24T switches provide Fail-Safe stackability when you install the optional BayStack 400-ST1 Cascade Module to your switches. Installation instructions are provided with the cascade module.

Depending on your network configuration requirements, connect the RJ-45 port cables, the console port, and any optional MDA port cables as described in the following sections. After attaching the devices to the BayStack 410-24T switch, proceed to "Connecting Power" on page 2-12 to connect the AC power cord and power up the switch.

You can connect the BayStack 410-24T switch to any equipment that conforms to the IEEE 802.3 standard, such as the following devices:

- Ethernet networking devices
- Individual workstations or servers
- Other switches, bridges, or hubs

Connecting the 10BASE-T Ports

Connect devices to the 10BASE-T ports as shown in Figure 2-5

The BayStack 410-24T switch 10BASE-T ports are configured with RJ-45 connectors that are wired as MDI-X ports. As in conventional Ethernet repeater hubs, the BayStack 410-24T switch ports connect via straight-through cables to the network interface card (NIC) in a node or server. When connecting to an Ethernet hub or to another switch, you must use a crossover cable. See Appendix D, “Connectors and Pin Assignments,” for more information.

A standard RJ-45 connection is provided to connect devices to the switch through the 10BASE-T ports.

Note: 10BASE-T/100BASE-TX MDA ports (optional) must use Category 5 UTP cable to accommodate the 100BASE-TX functionality.

To connect the RJ-45 port cables, insert the cable plug into the appropriate port connector until the release tab snaps into the locked position (Figure 2-5).

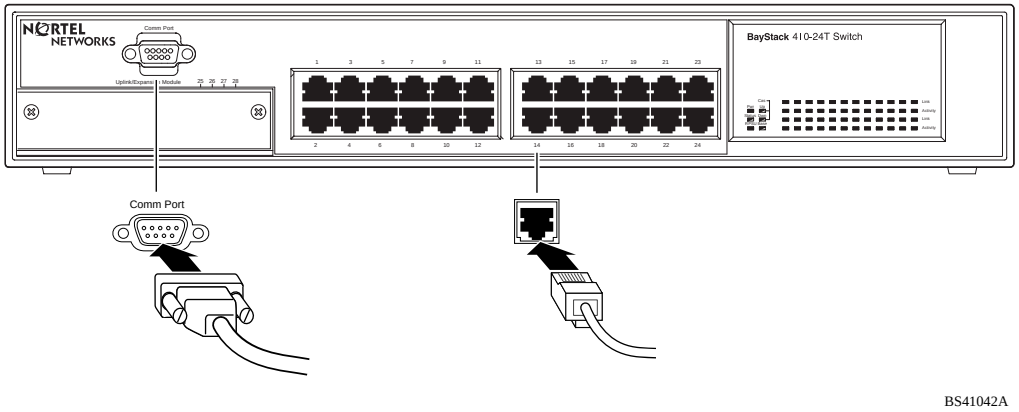


Figure 2-5. 10BASE-T Port Connections

Connecting Fiber Optic MDA Ports

Connect devices to (optional) MDA fiber optic ports as shown in Figure 2-6.

The 400-4FX MDA is a 100BASE-FX device that uses MT-RJ port connectors with 62.5/125 micron multimode fiber optic cable. The 400-2FX MDA is also a 100BASE-FX device but uses standard SC port connectors with 62.5/125 micron multimode fiber optic cable.

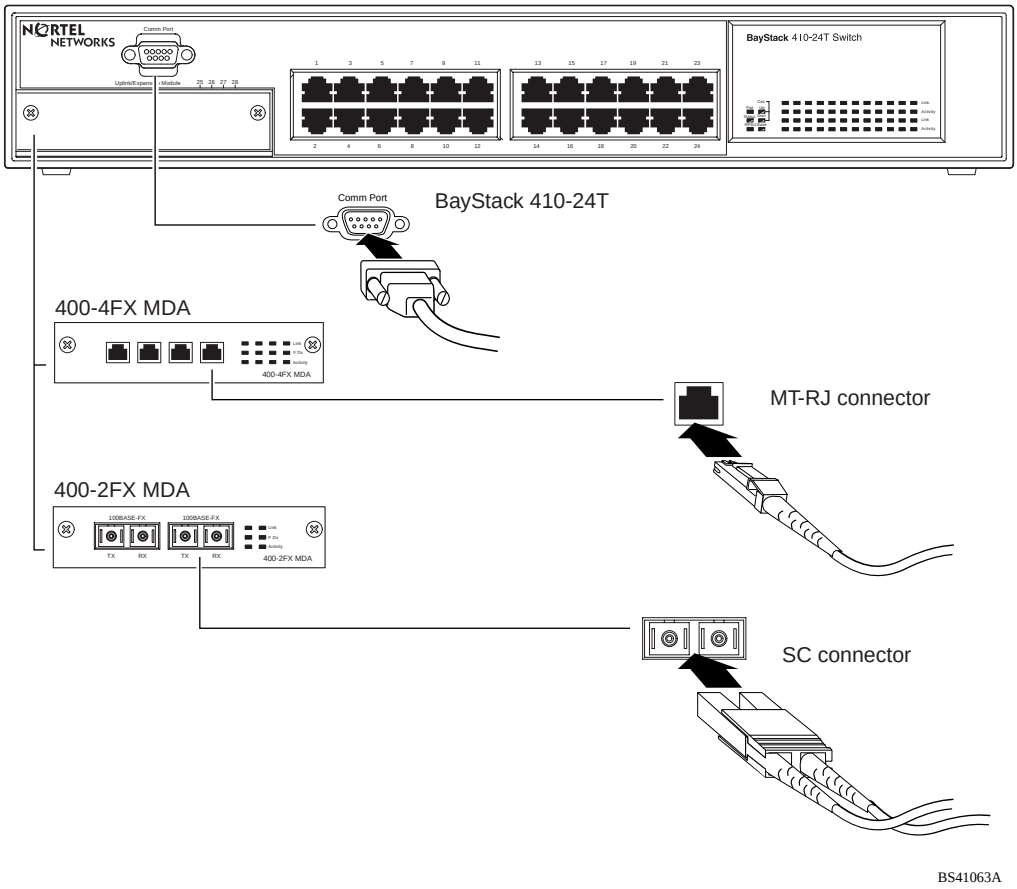


Figure 2-6. Fiber Optic Port Connections

Console/Comm Port

The serial console interface is an RS-232 port that enables a connection to a PC or terminal for monitoring and configuring a standalone switch or a stack configuration.You can also connect this port to an external modem to enable remote dial-in management of the switch. The port is a male DB-9 connector, implemented as a data communication equipment (DCE) connection.

To use the Console/Comm port, you need the following equipment:

- A terminal or TTY-compatible terminal, or a portable computer with a serial port and the ability to emulate a terminal.

  The terminal should have the following settings:

  -- 9600 baud

  -- No parity

  -- 8 bits

  -- 1 stop bit

  -- Window Terminal Emulator option set to NO

  -- Terminal Preferences: Function, Arrow, and Control keys active

  -- Buffer size set to 24

- A UL-listed straight-through RS-232 cable with a female DB-9 connector for the console port on the switch.

  The other end of the cable must have a connector appropriate to the serial port on your computer or terminal. (Most terminals or computers use a male DB-25 connector.)

  Any cable connected to the console port must be shielded to comply with emissions regulations and requirements.

See “DB-9 (RS-232-D) Console/Comm Port Connector” on page D-1 for a description of the pin assignments.

Connecting a Terminal to the Console/Comm Port

To connect a terminal to the Console/Comm port:

1. **Set the terminal protocol as described in "Console/Comm Port" on page 2-10.**
2. **Connect the terminal (or a computer in terminal-emulation mode) to the console port using the RS-232 cable.**
3. **Connect the female connector of the RS-232 cable directly to the Console/Comm Port on the switch, and tighten the captive retaining screws (see Figure 2-7).**

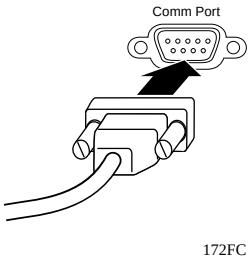


Figure 2-7. Connecting to the Console/Comm Port

4. **Connect the other end of the cable to a terminal or the serial connector of a personal computer running communications software.**
5. **Proceed to the next section, "Connecting Power," to connect the AC power cord and power up the BayStack 410-24T switch.**

Connecting Power

The BayStack 410-24T switch does not have a power on/off switch. When you connect the AC power cord to a suitable AC power outlet, the switch powers up immediately.

Warning: Removal of the power cord is the only way to turn off power to this device. The power cord must always be connected in a location that can be accessed quickly and safely in case of an emergency.

Vorsicht: Die Stromzufuhr zu diesem Gerät kann nur durch Ziehen des Netzstromkabels unterbrochen werden. Die Netzsteckdose, an die das Netzstromkabel angeschlossen ist, muß sich stets an einem Ort befinden, der bei einem Notfall schnell und einfach zugänglich ist.

Avertissement: Le débranchement du cordon d'alimentation constitue le seul moyen de mettre cet appareil hors tension. Le cordon d'alimentation doit donc toujours être branché dans une prise accessible pour faciliter la mise hors tension en cas d'urgence.

Advertencia: La única forma de desconectar la alimentación de este dispositivo es desenchufar el cable de alimentación. El cable de alimentación siempre debe estar conectado en una ubicación que permita acceder al cable de forma rápida y segura en caso de emergencia.

Avvertenza: Estrarre il cavo di alimentazione è l'unico sistema per spegnere il dispositivo. Il cavo di alimentazione deve essere sempre collegato in una posizione che permetta l'accesso facile e sicuro in caso di emergenza.

警告：電源コードを取り外すことが、このディバイスへの電源を切る唯一の方法です。電源コードは緊急の場合、迅速かつ安全に近づける場所に接続してください。

To connect the AC power cord, follow these steps:

1. **Plug one end of the AC power cord into the AC power receptacle on the switch back panel (Figure 2-8).**

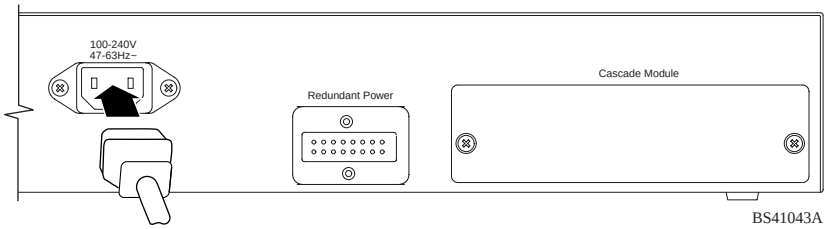


Figure 2-8. BayStack 410-24T Switch AC Power Receptacle

2. **Plug the other end of the AC power cord into the grounded AC power outlet (Figure 2-9).**

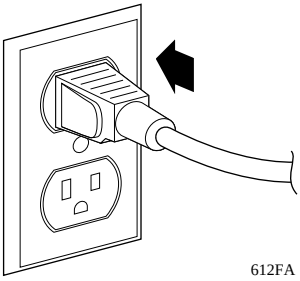


Figure 2-9. Grounded AC Power Outlet

3. **Proceed to the next section, "Verifying the Installation".**

Verifying the Installation

When power is applied to the switch, power-on self-tests are run. You can verify proper operation of the BayStack 410-24T switch by observing the front-panel LEDs or by viewing the self-test results as displayed in the BayStack 410-24T switch Self-Test screen.

Verifying the Installation Using the LEDs

To verify the installation using the LEDs, check that the switch power-up sequence is as described in Table 2-1:

Table 2-1. Power-Up Sequence

Stage	Description	LED indication
1	Immediately after AC power is applied to the switch, DC power is available to the switch's internal circuitry.	The Power LED turns on within 5 seconds (Figure 2-10). If the Power LED does not turn on, verify that power is available at the AC power outlet and that the power cable is fastened securely at both ends. If the Power LED remains off, contact the sales agent or the customer service representative from whom you purchased the switch.
2	The switch initiates a self-test.	As subroutines are initiated by the self-test, the port status LEDs flash various patterns. When the switch passes the self-test (within 10 seconds), the Status LED turns on (Figure 2-10). If a nonfatal error occurs during self-test, the Status LED blinks. If the switch fails the self-test, the Status LED remains off. Contact the sales agent or the customer service representative from whom you purchased the switch.

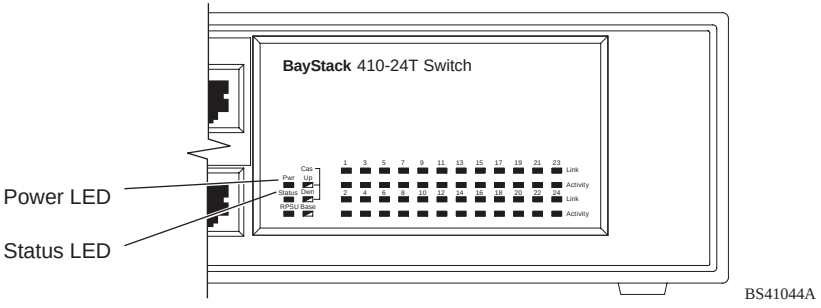


Figure 2-10. Observing LEDs to Verify Proper Operation

Verifying the Installation Using the Self-Test Screen

If a monitor is connected to the switch (see "Console/Comm Port" on page 2-10), you can observe the BayStack 410-24T switch Self-Test screen (Figure 2-11 shows an example of a standalone switch Self-Test screen).

The results of the self-test are displayed briefly (5 or 10 seconds) in the Self-Test screen, which is followed by the Nortel Networks Logo screen (Figure 2-12).

Note: The Self-Test screen remains displayed only if the self-test detects a fatal error.

```
BayStack 410-24T Self-Test

   CPU RAM test                    ... Pass
   ASIC addressing test            ... Pass
   ASIC buffer RAM test            ... Pass
   ASIC buffer stack init test     ... Pass
   Port internal loopback test     ... Pass
   Cascade SRAM test               ... Pass
   Fan test                        ... Pass

Self-test complete.
```

Figure 2-11. BayStack 410-24T Switch Self-Test Screen

Note: The Self-Test screen for a switch that is participating in a stack configuration includes an additional test: `Cascade SRAM test`.

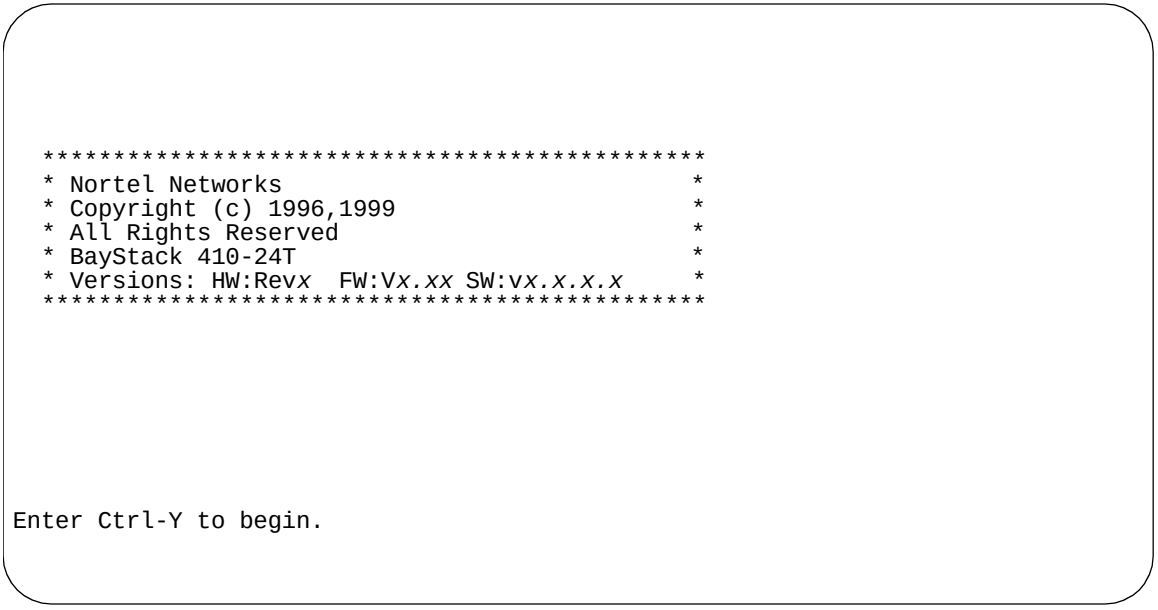


Figure 2-12. Nortel Networks Logo Screen

Note: The Nortel Networks logo screen for your switch will display the BayStack 410-24T model number and the current hardware, firmware, and software versions.

Upon successful completion of the power-up self-tests, the switch is ready for normal operation.

To access the BayStack 410-24T Main Menu, press [Ctrl]-Y.

Initial Setup

The BayStack 410-24T switch is designed for "plug-and-play" operation; in most cases the switch can be installed and made operational using the system default settings (see Appendix E, "Default Settings," for a list of default settings for the BayStack 410-24T switch).

However, for the switch management function to become fully operational, certain parameters must be configured. A minimal configuration is required when you plan on remote management or TFTP operations.

If you are configuring your BayStack 410-24T switches into a stack configuration, you will need to supply additional parameters to properly setup the stack.

This section includes the following information:

- Instructions for the initial (standalone) switch setup
- Instructions for the initial stack setup

After setting up your switch or stack configuration as described in the following sections, proceed to Chapter 3, "Using the Console Interface," for detailed descriptions of the menus and screens you can use to customize your configuration.

Standalone Switch Setup

For the initial setup of a standalone switch, you need to enter the IP address of the switch, the subnet mask, and the gateway address (refer to Chapter 3, "Using the Console Interface," for more information about configuring your BayStack 410-24T switch).

To set the IP address, subnet mask, and gateway address for the switch:

1. **Apply power to the switch.**
2. **After the Nortel Networks logo screen appears, press [Ctrl]-Y.**

   The Main Menu is displayed (Figure 2-13). The Main Menu hierarchy is described in Chapter 3, "Using the Console Interface."

```
                    BayStack 410-24T Main Menu


                    IP Configuration/Setup...
                    SNMP Configuration...
                    System Characteristics...
                    Switch Configuration...
                    Console/Comm Port Configuration...
                    Display Hardware Units...
                    Spanning Tree Configuration...
                    TELNET Configuration...
                    Software Download...
                    Configuration File...
                    Display Event Log
                    Reset
                    Reset to Default Settings
                    Logout



Use arrow keys to highlight option, press <Return> or <Enter> to select option.
```

Figure 2-13. Main Menu

3. **Select IP Configuration/Setup (or press i) from the Main Menu.**

   This selection displays the IP Configuration/Setup screen (Figure 2-14).

Note: The IP interface of the BayStack 410-24T switch is *only* on VLAN 1. You can manage the switch *only* from VLAN 1 (or via routers that connect VLAN 1 to the network management station).

Note: IP addresses are written as four decimal numbers (for example, 123.123.123.123). Each decimal number represents an 8-bit octet. When strung together, the four octets form the 32-bit Internet address. This is called dotted-decimal notation. The largest possible value of a field in a dotted-decimal number is 255, which represents an octet of all ones.

```
                              IP Configuration/Setup




                  BootP Request Mode:  [ BootP Disabled        ]

                                 Configurable          In Use         Last BootP
                               -------------------  ---------------  --------------
In-Band Stack IP Address:      [ 0.0.0.0 ]                           0.0.0.0
In-Band Switch IP Address:     [ 0.0.0.0 ]                           0.0.0.0
In-Band Subnet Mask:           [ 0.0.0.0 ]          0.0.0.0          0.0.0.0

Default Gateway:               [ 0.0.0.0 ]          0.0.0.0          0.0.0.0




Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 2-14. IP Configuration/Setup Screen (Standalone Switch)

4. **Enter the IP address of the switch in the In-Band IP Address field, then press [Return].**

Note: When the IP address is entered in the In-Band IP Address field, and the In-Band Subnet Mask field is not present, the software provides an *in-use* default value for the In-Band Subnet Mask field, based on the class of the entered IP address.

5. **Enter the IP subnet mask address in the In-Band Subnet Mask field, then press [Return].**
6. **Enter the default gateway address in the Default Gateway field, then press [Return].**

Proceed to Chapter 3, “Using the Console Interface,” for detailed descriptions of the menus and screens you can use to customize your configuration.

Stack Setup

For the initial setup of a stack configuration, you need to enter the stack IP address, the subnet mask, and the gateway address (refer to Chapter 3, "Using the Console Interface," for more information about configuring your BayStack 410-24T switch).

To set the stack IP address, subnet mask, and gateway address for the switch:

Note: Unless otherwise specified, the terms "switch" and "unit" are used interchangeably in this guide.

1. **Connect a console/terminal to one of the switches in the stack.**

   You can connect a console/terminal to any unit in the stack or to more than one stack unit (see "Console/Comm Port" on page 2-10).

2. **Power up the stack configuration.**

   Observe the console display screen.

3. **After the Nortel Networks logo screen appears, press [Ctrl]-Y:**

   a. **The console screen temporarily displays the (standalone) Main Menu screen (see Figure 2-15).**

      This is the same Main Menu screen that is displayed for a standalone switch, without stacking features.

   b. **Within 20 seconds after displaying the standalone Main Menu screen, the console screen refreshes to show the Main Menu screen for the stack configuration (Figure 2-16).**

      Although the Main Menu screen for the stack configuration looks similar to the standalone Main Menu screen, closer observation reveals that the stack features are included (see bolded text in Figure 2-16 on page 2-21).

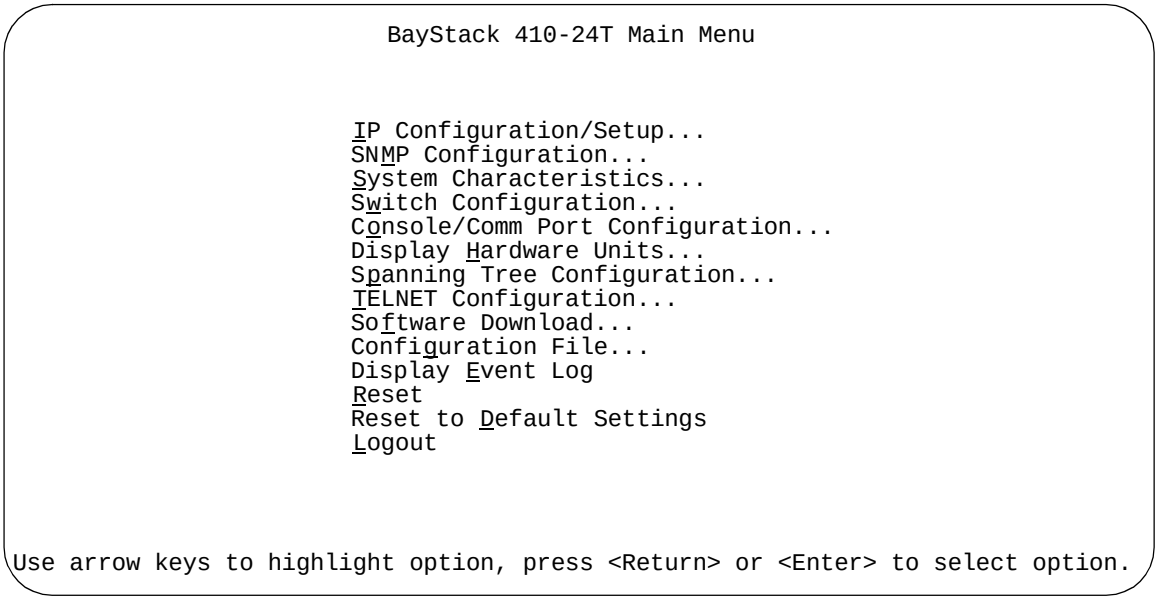


Figure 2-15. Main Menu (Standalone Switch Example)

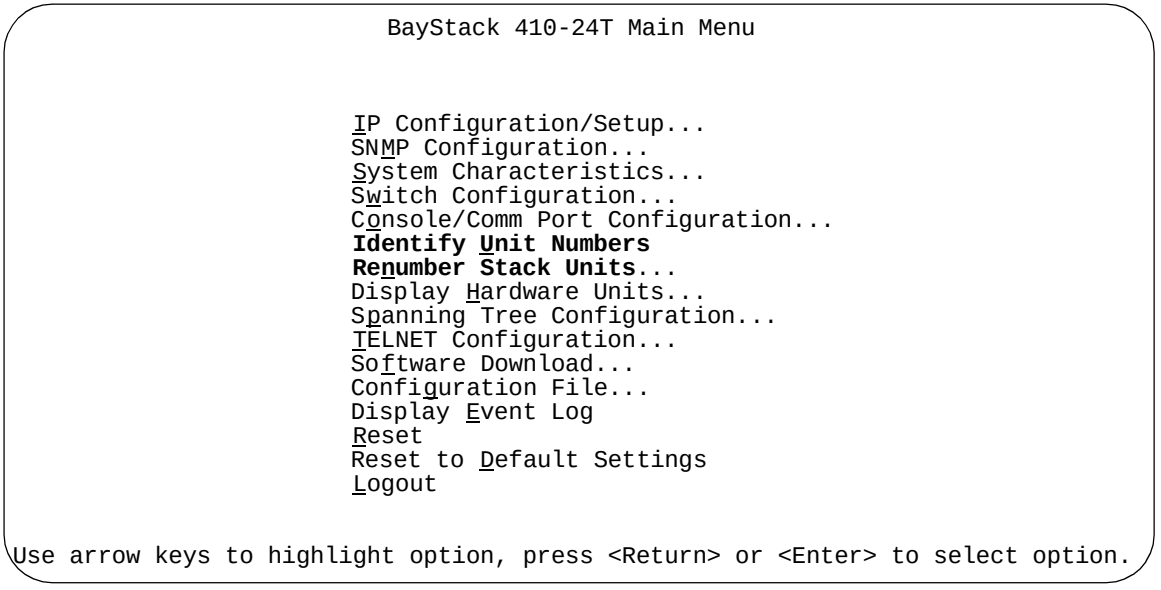


Figure 2-16. Main Menu (Stack Configuration Example)

4. **Select IP Configuration/Setup (or press i) from the Main Menu.**

   This selection displays the IP Configuration/Setup screen (Figure 2-17).

Note: The IP interface of the BayStack 410-24T switch is *only* on VLAN 1. You can manage the switch *only* from VLAN 1 (or via routers that connect VLAN 1 to the network management station).

```
                              IP Configuration/Setup




                    BootP Request Mode:  [ BootP Disabled        ]

                                  Configurable          In Use         Last BootP
                               -------------------  ---------------  --------------
In-Band Stack IP Address:      [ 0.0.0.0 ]                           0.0.0.0
In-Band Switch IP Address:     [ 0.0.0.0 ]                           0.0.0.0
In-Band Subnet Mask:           [ 0.0.0.0 ]           0.0.0.0         0.0.0.0

Default Gateway:               [ 0.0.0.0 ]           0.0.0.0         0.0.0.0




Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 2-17. IP Configuration/Setup Screen (Stack Configuration)

5. **Enter the Stack IP address in the In-Band Stack IP Address field, then press [Return].**

   The *In-Band Switch IP Address* field (directly below the In-Band Stack IP Address field) is not required for the operation of the stack. The In-Band Switch IP Address field allows this switch to operate as a standalone switch. Both IP address fields cannot be configured to use the *same* IP address.

Note: IP addresses are written as four decimal numbers (for example, 123.123.123.123). Each decimal number represents an 8-bit octet. When strung together, the four octets form the 32-bit Internet address. This is called dotted-decimal notation. The largest possible value of a field in a dotted-decimal number is 255, which represents an octet of all ones.

6. **Enter the IP subnet mask address in the In-Band Subnet Mask field, then press [Return].**
7. **Enter the default gateway address in the Default Gateway field, then press [Return].**

Proceed to Chapter 3, “Using the Console Interface,” for detailed descriptions of the menus and screens you can use to customize your configuration.

Chapter 3
Using the Console Interface

This chapter describes how to configure and manage the BayStack 410-24T switch using the menu-driven console interface (CI).

This chapter covers the following topics:

- Accessing the CI menus and screens
- Using the CI menus and screens
- Description of options available from the main menu

Accessing the CI Menus and Screens

You can access the CI menus and screens locally through a console terminal, remotely through a dial-up modem connection, or in-band through a TELNET session (see “Console/Comm Port” on page 2-10).

You can also manage the BayStack 410-24T switch using Bay Networks Optivity network management software or any generic SNMP-based management software; however, certain parameters such as the switch IP address, or stack IP address, if configured, must be supplied for the switch management function to become fully operational (see “Initial Setup” on page 2-17).

Note: If you have a properly configured BootP server in your network, it will detect the IP address; you will not need to configure the IP address.

For information about SNMP, see your network management documentation.

Using the CI Menus and Screens

The CI menus and screens provide options that allow you to configure and manage the BayStack 410-24T switch. Help prompts at the bottom of each menu and screen explain how to enter data in the highlighted field and how to navigate the menus and screens.

Some options allow you to toggle among several possible values; other options allow you to set or modify a parameter.

Navigating the CI Menus and Screens

Use the following methods to navigate the CI menus and screens:

- To select a menu option:
  a. Use the arrow keys to highlight the option name.
  b. Press [Enter].

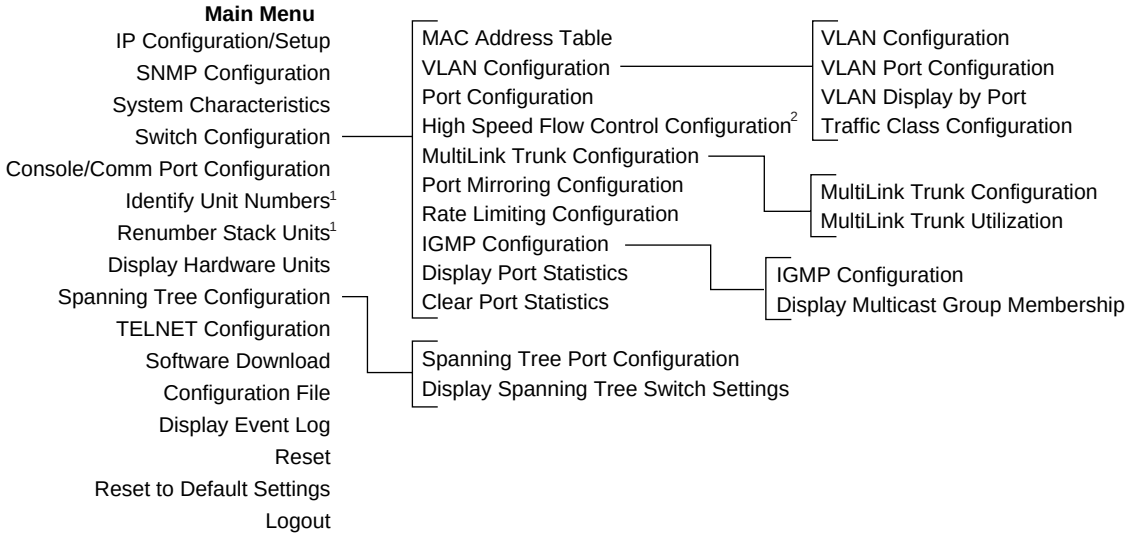
  The option takes effect immediately after you press [Enter].

  Alternatively, you can press the key corresponding to the underlined letter in the option name. For example, to select the Switch Configuration option in the main menu, press the w key. Note that the text characters are not case sensitive.
- To toggle between values in a form:
  a. Use the spacebar to highlight the value.
  b. Press [Enter].
- To clear a string field:
  a. Position the cursor in the string field.
  b. Press [Ctrl]-K.
- To return to the previous menu, press [Ctrl]-R.
- To return to the main menu at any time, press [Ctrl]-C.
- Press [Backspace] to delete entered text.

Options that appear in brackets (for example, [Enabled]) are user settable.

Screen Fields and Descriptions

Figure 3-1 shows a map of the CI screens. The remainder of this chapter describes the CI screens and their fields, beginning with the main menu.



[1] Only appears when the switch is participating in a stack configuration.
[2] Only appears when a gigabit MDA is installed in one or more units in a stack configuration.

BS41045B

Figure 3-1. Map of Console Interface Screens

The CI screens for your specific switch model will show the correct model name in the main menu screen title and the correct number of ports and port types in the Port Configuration screen.

Note: The field values shown in the CI screens in this section are provided as examples only.

Main Menu

This section describes the options available from the CI main menu (Figure 3-2). The CI screens and submenus for these options are described in the following sections.

Note: Some menu options shown in this main menu example and in other screen examples in this chapter may not appear on your screen, depending on the switch options installed. However, the full menu options are shown in the screen examples and described in the following sections.

```
                        BayStack 410-24T Main Menu



                    IP Configuration/Setup...
                    SNMP Configuration...
                    System Characteristics...
                    Switch Configuration...
                    Console/Comm Port Configuration...
                    Identify Unit Numbers
                    Renumber Stack Units...
                    Display Hardware Units...
                    Spanning Tree Configuration...
                    TELNET Configuration...
                    Software Download...
                    Configuration File...
                    Display Event Log
                    Reset
                    Reset to Default Settings
                    Logout

Use arrow keys to highlight option, press <Return> or <Enter> to select option.
```

Figure 3-2. Console Interface Main Menu

Table 3-1 describes the CI main menu options.

Table 3-1. Console Interface Main Menu options

Option	Description
IP Configuration/ Setup...	Displays the IP Configuration/Setup screen (see "IP Configuration/Setup" on page 3-7). This screen allows you to set or modify IP configuration parameters.
SNMP Configuration...	Displays the SNMP Configuration screen (see "SNMP Configuration" on page 3-12). This screen allows you to set or modify the SNMP read-only community and read-write community strings, enable or disable the authentication trap and the link Up/down trap, set the IP address of trap receivers, and set the trap community strings.
System Characteristics...	Displays the System Characteristics screen (see "System Characteristics" on page 3-14). This screen allows you to view switch characteristics, including number of resets, power status, hardware and firmware version, and MAC address. This screen also contains three user-configurable fields: sysContact, sysName, and sysLocation. When the switch is part of a stack configuration, this screen also displays the base unit identification, the number of units configured in the stack, and the local unit stack number.
Switch Configuration...	Displays the Switch Configuration Menu screen (see "Switch Configuration Menu" on page 3-17). This menu provides the following configuration options: MAC Address Table, VLAN Configuration, Port Configuration, MultiLink Trunk Configuration, Port Mirroring Configuration, Rate Limiting Configuration, IGMP Configuration, Display Port Statistics, and Clear All Port Statistics.
Console/Comm Port Configuration...	Displays the Console/Comm Port Configuration screen (see "Console/Comm Port Configuration" on page 3-65). This screen allows you to configure and modify the console/Comm port parameters, including the console port speed and password settings for the switch and stack operation.
Identify Unit Numbers	Only appears when the switch is participating in a stack configuration. When selected, this option identifies the unit numbering of each unit in a stack configuration by lighting the corresponding number of Link LEDs for approximately 10 seconds. For example, in a four-unit stack, unit 1 displays one Link LED, unit 2 displays two Link LEDs, unit 3 displays three Link LEDs, and unit 4 displays four Link LEDs. The LED display *temporarily* overrides any existing Link LED indications on all unit LED display panels.
Renumber Stack Units	Only appears when the switch is participating in a stack configuration. Displays the Renumber Stack Units screen (see "Renumber Stack Units" on page 3-72). This screen allows you to renumber the units at any time.
Display Hardware Units	Displays the Hardware Unit Information screen (see "Hardware Unit Information" on page 3-74). This screen lists the switch models, including any installed MDA and Cascade modules, that are configured in your standalone or stack configuration.

(continued)

Table 3-1. Console Interface Main Menu options *(continued)*

Option	Description
Spanning Tree Configuration...	Displays the Spanning Tree Configuration Menu (see "Spanning Tree Configuration" on page 3-74). This menu provides the following options: Spanning Tree Port Configuration, Display Spanning Tree Switch Settings.
TELNET Configuration...	Displays the TELNET Configuration screen (see "TELNET Configuration" on page 3-82). This screen allows you to set your switch to enable a user at a remote console terminal to communicate with the BayStack 410-24T switch as if the console terminal were directly connected to it. You can have up to four active TELNET sessions running at one time in either a standalone switch or a stack configuration.
Software Download...	Displays the Software Download screen (see "Software Download" on page 3-85). This screen allows you to revise the BayStack 410-24T switch software image that is located in nonvolatile flash memory.
Configuration File	Displays the Configuration File Downlod/Upload screen (see "Configuration File" on page 3-89). This screen allows you to store your switch/stack configuration parameters on a TFTP server. You can retrieve the configuration parameters for automatically configuring a replacement switch or stack with the same configuration when required.
Display Event Log	Displays the Event Log screen (see "Display Event Log" on page 3-92).
Reset	Resets the switch with the current configuration settings. This option is followed by a screen prompt that precedes the action. Enter Yes to reset the switch; enter No to abort the option: • If the switch is participating in a stack configuration, additional prompts allow you to choose to reset a specific unit in the stack or the entire stack. • When you select this option, the switch resets, runs a self-test, then displays the Nortel Networks logo screen. Press [Ctrl]-Y to access the BayStack 410-24T main menu.
Reset to Default Settings	Resets the switch to the factory default configuration settings. This option is followed by a screen prompt that precedes the action. Enter Yes to reset the switch to the factory default configuration settings; enter No to abort the option: • If the switch is participating in a stack configuration, additional prompts allow you to choose to reset a specific unit in the stack or the entire stack. • When you select this option, the switch resets, runs a self-test, then displays the Nortel Networks logo screen. Press [Ctrl]-Y to access the BayStack 410-24T main menu.

Caution: If you choose the Reset to Default Settings option, all of your configured settings will be replaced with factory default settings when you press [Enter].

(continued)

Table 3-1. Console Interface Main Menu options *(continued)*

Option	Description
	Achtung: Bei Auswahl des Befehls zur Rücksetzung auf die Standardeinstellungen werden alle von Ihnen konfigurierten Einstellungen durch die werkseitigen Standardeinstellungen ersetzt, wenn Sie die Eingabetaste drücken.
	Attention: Si vous restaurez la configuration usine, votre configuration courante sera remplacée par la configuration usine dès que vous appuierez sur [Entrée].
	Precaución: Si selecciona el comando Restaurar valores predeterminados, todos los valores de configuración se sustituirán por las valores predeterminados en fábrica al pulsar [Intro].
	Attenzione: Nel caso in cui si selezioni la reimpostazione dei valori di default, tutte le impostazioni configurate verranno sostituite dai default di fabbrica premendo il tasto [Invio].
	注意: 「デフォルトの設定にリセット」コマンドを選択すると、現在のコンフィグレーションされた設定は、[Enter]を押したとき、工場出荷時の設定に変更されます。
Logout	Allows a user in a TELNET session or a user working at a password-protected console terminal to terminate the session (see "Logout" on page 3-100).

IP Configuration/Setup

The IP Configuration/Setup screen (Figure 3-3) allows you to set or modify the BayStack 410-24T switch IP configuration parameters. Data that you enter in the user-configurable fields takes effect as soon as you press [Enter].

Choose IP Configuration/Setup (or press i) from the main menu to open the IP Configuration/Setup screen.

```
                          IP Configuration/Setup



                BootP Request Mode:  [ BootP Disabled        ]

                             Configurable          In Use         Last BootP
                          -------------------  ---------------  ---------------
In-Band Stack IP Address:  [ 0.0.0.0 ]                          0.0.0.0
In-Band Switch IP Address: [ 0.0.0.0 ]                          0.0.0.0
In-Band Subnet Mask:       [ 0.0.0.0 ]          0.0.0.0         0.0.0.0

Default Gateway:           [ 0.0.0.0 ]          0.0.0.0         0.0.0.0




Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-3. IP Configuration/Setup Screen

Note: The read-only fields in this screen are updated based on the BootP mode specified in the BootP Request Mode field. (See "Choosing a BootP Request Mode" on page 3-10 for more information.)

Table 3-2 describes the IP Configuration/Setup screen fields.

Table 3-2. IP Configuration/Setup Screen Fields

Field	Description	
BootP Request Mode	One of four modes of operation for BootP. (See "Choosing a BootP Request Mode" on page 3-10 for details about the four modes.)	
	Default Value	BootP Disabled
	Range	BootP Disabled, BootP or Last Address, BootP When Needed, BootP Always

(continued)

Table 3-2. IP Configuration/Setup Screen Fields *(continued)*

Field	Description	
Configurable	Column header for the user-configurable fields in this screen. The data displayed in this column represents parameters that you can configure (or that are currently configured).	
In Use	Column header for the read-only fields in this screen. The read-only data displayed in this column represents data that is currently in use.	
Last BootP	Column header for the read-only fields in this screen. The read-only data displayed in this column represents data obtained from the last BootP reply received.	
In-Band Stack IP Address	The in-band *stack* IP address field.	
	Default Value	0.0.0.0 (no IP address assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
In-Band Switch IP Address	The in-band IP address of the BayStack 410-24T switch. This field is not required for the operation of the stack. This field can not use the same IP address used for the stack.	
	Default Value	0.0.0.0 (no IP address assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
	Note: When the IP address is entered in the In-Band IP Address field, and the In-Band Subnet Mask field value is not present, the software provides an *in-use* default value for the In-Band Subnet Mask field that is based on the class of the IP address entered in the In-Band IP Address field.	
In-Band Subnet Mask	The subnet address mask associated with the in-band IP address shown on the screen (see Note above). Network routers use the subnet mask to determine the network or subnet address portion of a host's IP address. The bits in the IP address that contain the network address (including the subnet) are set to 1 in the address mask, and the bits that contain the host identifier are set to 0.	
	Default Value	0.0.0.0 (no subnet mask assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
Default Gateway	The IP address of the default gateway.	
	Default Value	0.0.0.0 (no IP address assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point

Choosing a BootP Request Mode

The BootP Request Mode field in the IP Configuration screen allows you to choose which method the switch uses to broadcast BootP requests:

- BootP Disabled
- BootP or Last Address
- BootP When Needed
- BootP Always

Note: Whenever the switch is broadcasting BootP requests, the BootP process will time out if a reply is not received within (approximately) 7 minutes. When the process times out, the BootP request mode automatically changes to BootP Disabled mode. To restart the BootP process, change the BootP request mode to any of the three following modes: BootP When Needed, BootP Always, or to BootP or Last Address.

BootP Disabled

Allows the switch to be managed only by using the IP address set from the console terminal (this is the default mode for your switch). When selected, this mode operates as follows:

- The switch does not broadcast BootP requests, regardless of whether an IP address is set from the console terminal.
- The switch can be managed only by using the in-band IP address set from the console terminal.

These actions take effect after the switch is reset or power cycled, even if an IP address is not currently in use.

BootP or Last Address

Allows the switch to be managed even if a BootP server is not reachable. When selected, this mode operates as follows:

- When the IP data is entered from the console terminal, the data becomes the in-band address of the switch and BootP requests are not broadcast. The switch can be managed using this in-band IP address.

- When the in-band IP address is not set from the console terminal, the switch broadcasts BootP requests until it receives a BootP reply containing an in-band IP address. If the switch does not receive a BootP reply that contains an in-band IP address within 10 minutes, the switch uses the last in-band IP address it received from a BootP server. This IP information is displayed in the Last BootP column.

If an IP address is *not* currently in use, these actions take effect immediately. If an IP address *is* currently in use, these actions take effect only after the switch is reset or power cycled.

BootP When Needed

Allows the switch to request an IP address if one has not already been set from the console terminal. When selected, this mode operates as follows:

- When the IP data is entered from the console terminal, the data becomes the in-band address of the switch and BootP requests are not broadcast. The switch can be managed using this in-band IP address.
- When the in-band IP address is not set from the console terminal, the switch broadcasts BootP requests until it receives a BootP reply containing an IP address. If the switch does not receive a BootP reply that contains an IP address, the switch cannot be managed in-band.

If an IP address is *not* currently in use, these actions take effect immediately. If an IP address *is* currently in use, these actions take effect only after the switch is reset or power cycled.

BootP Always

Allows the switch to be managed only when configured with the IP address obtained from the BootP server. When selected, this mode operates as follows:

- The switch continues to broadcast BootP requests, regardless of whether an in-band IP address is set from the console terminal.
- If the switch receives a BootP reply that contains an in-band IP address, the switch uses this new in-band IP address.
- If the switch does not receive a BootP reply, the switch cannot be managed using the in-band IP address set from the console terminal.

If an IP address is *not* currently in use, these actions take effect immediately. If an IP address *is* currently in use, these actions take effect only after the switch is reset or power cycled.

SNMP Configuration

The SNMP Configuration screen (Figure 3-4) allows you to set or modify the SNMP configuration parameters.

Choose SNMP Configuration (or press m) from the main menu to open the SNMP Configuration screen.

```
                              SNMP Configuration



       Read-Only Community String:   [ public ]
       Read-Write Community String:  [ private ]

       Trap #1 IP Address:           [ 0.0.0.0 ]
               Community String:     [  ]
       Trap #2 IP Address:           [ 0.0.0.0 ]
               Community String:     [  ]
       Trap #3 IP Address:           [ 0.0.0.0 ]
               Community String:     [  ]
       Trap #4 IP Address:           [ 0.0.0.0 ]
               Community String:     [  ]

       Authentication Trap:          [ Enabled  ]
       AutoTopology:                 [ Enabled  ]



Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-4. SNMP Configuration Screen

Table 3-3 describes the SNMP Configuration screen fields.

Table 3-3. SNMP Configuration Screen Fields

Field	Description	
Read-Only Community String	The community string used for in-band read-only SNMP operations.	
	Default Value	public
	Range	Any ASCII string of up to 32 printable characters
Read-Write Community String	The community string used for in-band read-write SNMP operations.	
	Default Value	private
	Range	Any ASCII string of up to 32 printable characters
Trap #1 IP Address[1]	Number one of four trap IP addresses. Successive trap IP address fields are numbered 2, 3, and 4. Each trap address has an associated community string (see Community String).	
	Default Value	0.0.0.0 (no IP address assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
Community String[1]	The community string associated with one of the four trap IP addresses (see Trap #1 IP Address).	
	Default Value	Zero-length string
	Range	Any ASCII string of up to 32 printable characters
Authentication Trap	Determines whether a trap will be sent when there is an SNMP authentication failure.	
	Default Value	Enabled
	Range	Enabled, Disabled
AutoTopology	Allows you to enable or disable the switch participation in autotopology, which allows network topology mapping of other switches in your network.	
	Default Value	Enabled
	Range	Enabled, Disabled

1 The Trap IP Address and Community String fields can be set using a MIB table (in a Nortel Networks proprietary MIB). The status of the row in the MIB table can be set to Valid or Ignore. If the row status is set to Ignore, the fields appear to be set when viewed from the console terminal; however, no traps will be sent to that address until the row status is set to Valid. When a Trap IP Address is entered from the console, the row status is always set to Valid.

System Characteristics

The System Characteristics screen (Figure 3-5) allows you to view system characteristics and contains three user-configurable fields: sysContact, sysName, and sysLocation.

Choose System Characteristics (or press s) from the main menu to open the System Characteristics screen.

```
                          System Characteristics

Operation Mode:   Stack, Unit # 1
Size Of Stack:    4
Base Unit:        1

MAC Address:      00-00-81-C1-20-D6

Reset Count:      47
Last Reset Type:  Power Cycle
Power Status:     Primary Power
Local MDA Type:   4 port 10Base-T/100Base-TX with Autosense, 400-4TX MDA
sysDescr:         BayStack 410-24T HW:Revx  FW:Vx.xx SW:vx.x.x.x
sysObjectID:      1.3.6.1.4.1.45.3.36.1
sysUpTime:        00:38:40
sysServices:      3
sysContact:       [ Mario Lento ]
sysName:          [ Publications Library ]
sysLocation:      [ Building 20, Floor 29 ]



Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-5. System Characteristics Screen

Table 3-4 describes the System Characteristics screen fields.

Table 3-4. System Characteristics Screen Fields

Field	Description
Operation Mode	Read-only field that indicates the operation mode of the unit, for example: • When the unit is part of a stack configuration, the (read-only) field indicates the unit is operational in a stack, and lists the current unit number of this switch. In this example (see Figure 3-5 on page 3-14), the current unit number is Unit 2. • When the unit is *not* part of a stack configuration (operating standalone), the read-only field indicates the unit is operating as a switch. When in this operation mode, the Size of Stack and Base Unit fields (see following description) do not appear.
Size of Stack	This read-only field only appears when the switch is participating in a stack configuration. This field indicates the number of units configured in the stack configuration (1 to 8 units maximum).
Base Unit	This read-only field only appears when the switch is participating in a stack configuration. This field indicates the unit number of the switch that is currently operating as the base unit.
MAC Address	The MAC address of the BayStack 410-24T switch or, when the switch is participating in a stack configuration, the MAC address of the stack configuration.
Reset Count	A read-only field that indicates the number of resets since the operational firmware was first loaded on the switch. Default Value 1 Range 0 to 2^{32} -1
Last Reset Type	A read-only field that indicates the last type of reset. Default Value Power Cycle Range Power Cycle, Software Download, Management Reset, Management Factory Reset
Power Status	A read-only field that indicates the current power source (primary, RPSU, or both). Default Value Primary Power Range Primary Power, Redundant Power, Primary and Redundant Power
Local MDA Type	A read-only field that indicates the MDA type that is configured in this unit.
sysDescr	A read-only field that specifies the hardware and software version.
sysObjectID	A read-only field that provides a unique identification of the switch, which contains the vendor's private enterprise number.

(continued)

Table 3-4. System Characteristics Screen Fields *(continued)*

Field	Description	
sysUpTime	A read-only field that shows the length of time since the last reset. Note that this field is updated when the screen is redisplayed.	
sysServices	A read-only field that indicates the switch's physical and data link layer functionality.	
sysContact	The name and phone number of the person responsible for the switch.	
	Default Value	Zero-length string
	Range	Any ASCII string of up to 56 printable characters[1]
sysName	A name that uniquely identifies the switch.	
	Default Value	Zero-length string
	Range	Any ASCII string of up to 56 printable characters[1]
sysLocation	The physical location of the switch.	
	Default Value	Zero-length string
	Range	Any ASCII string of up to 56 printable characters

1 Although this field can be set to up to 255 characters from a Network Management Station (NMS), only 56 characters are displayed on the console terminal.

Switch Configuration Menu

The Switch Configuration Menu screen (Figure 3-6) allows you to set or modify your switch configuration.

Choose Switch Configuration (or press w) from the main menu to open the Switch Configuration Menu screen.

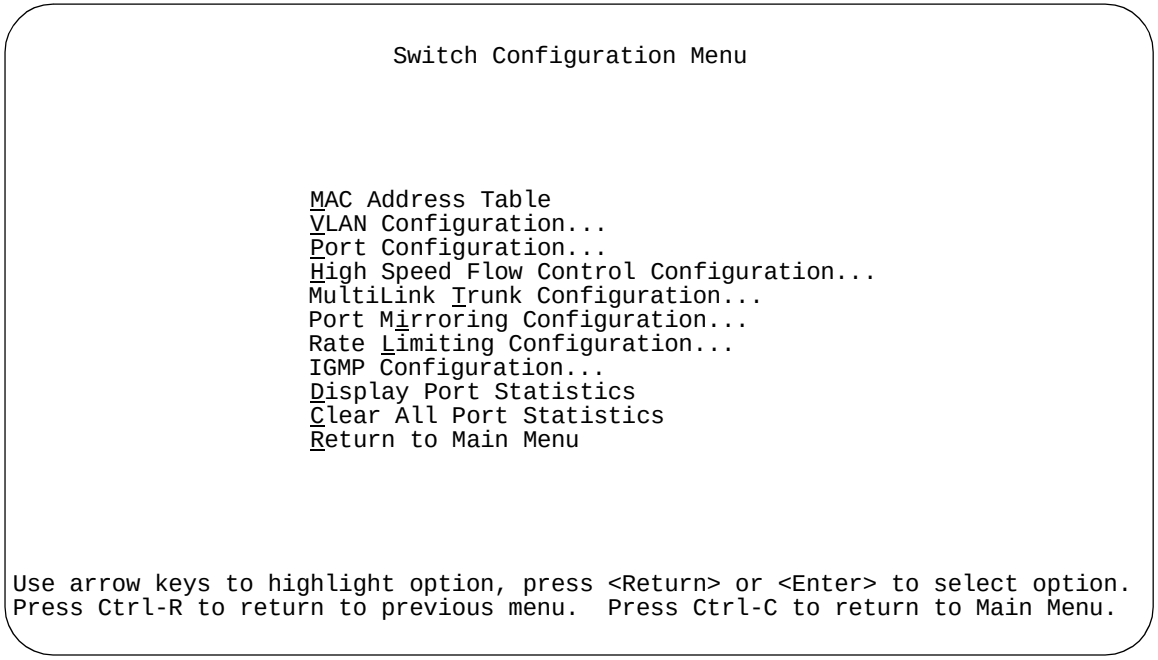

Switch Configuration Menu
MAC Address Table
VLAN Configuration...
Port Configuration...
High Speed Flow Control Configuration...
MultiLink Trunk Configuration...
Port Mirroring Configuration...
Rate Limiting Configuration...
IGMP Configuration...
Display Port Statistics
Clear All Port Statistics
Return to Main Menu
Use arrow keys to highlight option, press <Return> or <Enter> to select option.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-6. Switch Configuration Menu Screen

Table 3-5 describes the Switch Configuration Menu screen options.

Table 3-5. Switch Configuration Menu Screen Options

Option	Description
MAC Address Table	Displays the MAC Address Table screen (see "MAC Address Table" on page 3-19). This screen allows you to view all MAC addresses and their associated port or trunk that the switch has learned, or to search for a particular MAC address (to see if the switch has learned the address).
VLAN Configuration...	Displays the VLAN Configuration Menu (see "VLAN Configuration Menu" on page 3-22). This menu provides the following options: VLAN Configuration, VLAN Port Configuration, VLAN Display by Port, Traffic Class Configuration, and Return to Switch Configuration Menu screen. This menu allows you to create and modify VLANs.
Port Configuration...	Displays the Port Configuration screen (see "Port Configuration" on page 3-36). This screen allows you to configure a specific switch port, all switch ports or, when in a stack configuration, all stack ports.
High Speed Flow Control Configuration...	Only appears when an optional gigabit MDA is installed in one of the units of a stacked configuration. When the gigabit MDA is installed, selecting this option displays the High Speed Flow Control Configuration screen (see "High Speed Flow Control Configuration" on page 3-38).
MultiLink Trunk Configuration...	Displays the MultiLink Trunk Configuration Menu (see "MultiLink Trunk Configuration" on page 3-41). This menu provides the following options: MultiLink Trunk Configuration, MultiLink Trunk Utilization, and Return to Switch Configuration Menu. This menu allows you to create and modify trunks, and to monitor the bandwidth utilization of configured trunks.
Port Mirroring Configuration...	Displays the Port Mirroring Configuration screen (see "Port Mirroring Configuration" on page 3-48). This screen allows you to designate a single switch port as a traffic monitor for up to two specified ports or addresses.
Rate Limiting Configuration...	Displays the Rate Limiting Configuration screen (see "Rate Limiting Configuration" on page 3-52). This screen allows you to limit the forwarding rate of broadcast and multicast packets.
IGMP Configuration...	Displays the IGMP Configuration Menu (see "IGMP Configuration Menu" on page 3-55). This screen allows you to optimize multicast traffic by setting up IGMP port memberships that filter multicast on a per port basis (see "IGMP Snooping" on page 1-48 for more information about this feature).

(continued)

Table 3-5. Switch Configuration Menu Screen Options *(continued)*

Option	Description
Display Port Statistics	Displays the Port Statistics screen (see "Port Statistics" on page 3-61). This screen allows you to view detailed information about any switch port.

Clear All Port Statistics	Allows you to clear all port statistics.
	
	This option is followed by screen prompts that precede a choice of actions:
	• If the switch is operating *standalone*, choose one of the following:
	  • Yes, to clear all port statistics for all switch ports
	  • No, to abort the option
	• If the switch is *participating in a stack configuration*, choose one of the following:
	  • Clear all port statistics for a specific unit in the stack
	  • Clear all port statistics for the entire stack
	  • No, to abort the option

Return to Main Menu	Exits the Switch Configuration Menu screen and displays the main menu.

MAC Address Table

The MAC Address Table screen (Figure 3-7) allows you to view MAC addresses that the switch has learned or to search for a specific MAC address.

The MAC Address Table screen also operates in conjunction with the Port Mirroring Configuration screen. When you configure a switch for MAC address-based port mirroring, you can use the MAC Address Table screen to find an address, and enter the address directly from this screen. You can enter addresses from either screen, but you must return to the Port Mirroring Configuration screen to activate the feature (see "Port Mirroring Configuration" on page 3-48).

Choose MAC Address Table (or press m) from the Switch Configuration Menu screen to open the MAC Address Table screen.

Note: This screen does not refresh dynamically to show new entries. To refresh the screen, press [Ctrl]-R to return to the previous menu.

```
                              MAC Address Table

                  Aging Time:           [ 300 seconds ]
                  Find an Address:      [ 00-00-00-00-00-00 ]
            Port Mirroring Address A:   [ 00-44-55-44-55-22 ]
            Port Mirroring Address B:   [ 00-33-44-33-22-44 ]



00-60-FD-00-02-30
00-00-A2-85-BB-26    Port: 1
00-60-FD-12-02-15    Port: 1
00-08-C7-1D-4F-38              Trunk:3









End of Address Table.  Press Ctrl-P to see previous display.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-7. MAC Address Table Screen

Table 3-6 describes the MAC Address Table screen fields.

Table 3-6. MAC Address Table Screen Fields

Field	Description
Aging Time	Specifies how long a learned MAC address remains in the switch's forwarding database. If an entry is inactive for a period of time that exceeds the specified aging time, the address is removed.
	Default Value 300 seconds
	Range 10 to 1,000,000 seconds
Find an Address	Allows the user to search for a specific MAC address.
	Default Value 00-00-00-00-00-00 (no MAC address assigned)
	Range 00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF

(continued)

Table 3-6. MAC Address Table Screen Fields *(continued)*

Field	Description
Port Mirroring Address A	Only appears when any of the five *address-based* monitoring modes are selected from the Port Mirroring Configuration screen. When you enter a MAC address in this field, it is also configured into the Port Mirroring Configuration screen. Conversely, when you enter the MAC address from the Port Mirroring Configuration screen, it also appears in this screen. See "Port Mirroring Configuration" on page 3-48 for more information. Default Value 00-00-00-00-00-00 (no MAC address assigned) Range 00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF
Port Mirroring Address B	Only appears when any of the two *address-based* monitoring modes that use Address B are selected from the Port Mirroring Configuration screen. When you enter a MAC address in this field, it is also configured into the Port Mirroring Configuration screen. Conversely, when you enter the MAC address from the Port Mirroring Configuration screen, it also appears in this screen. See "Port Mirroring Configuration" on page 3-48 for more information. Default Value 00-00-00-00-00-00 (no MAC address assigned) Range 00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF

VLAN Configuration Menu

The VLAN Configuration Menu screen (Figure 3-8) allows you to select the appropriate screen to configure up to 64 VLANs (VLAN 1 is port-based, by default). You can configure as many as 63 protocol-based VLANs, with up to 15 different protocols. The number of different protocols you can configure depends on the number of hexidecimal values (PID values) associated with the protocol type (some protocol types use more than one PID value, see Table 3-9 on page 3-28).

Note: The BayStack 410-24T switch ports do not have the ability to assign incoming untagged frames to a protocol-based VLAN (see "Gigabit Ports and BayStack 410-24T Switch Ports Restriction" on page 3-30).

When you create VLANs, you can assign various ports (and therefore the devices attached to these ports) to different broadcast domains. Creating VLANs increases network flexibility by allowing you to reassign devices to accommodate network moves, additions, and changes, eliminating the need to change physical cabling.

See "IEEE 802.1Q VLAN Workgroups" on page 1-32 for detailed information about configuring VLANs.

Choose VLAN Configuration (or press v) from the Switch Configuration Menu screen to open the VLAN Configuration Menu.

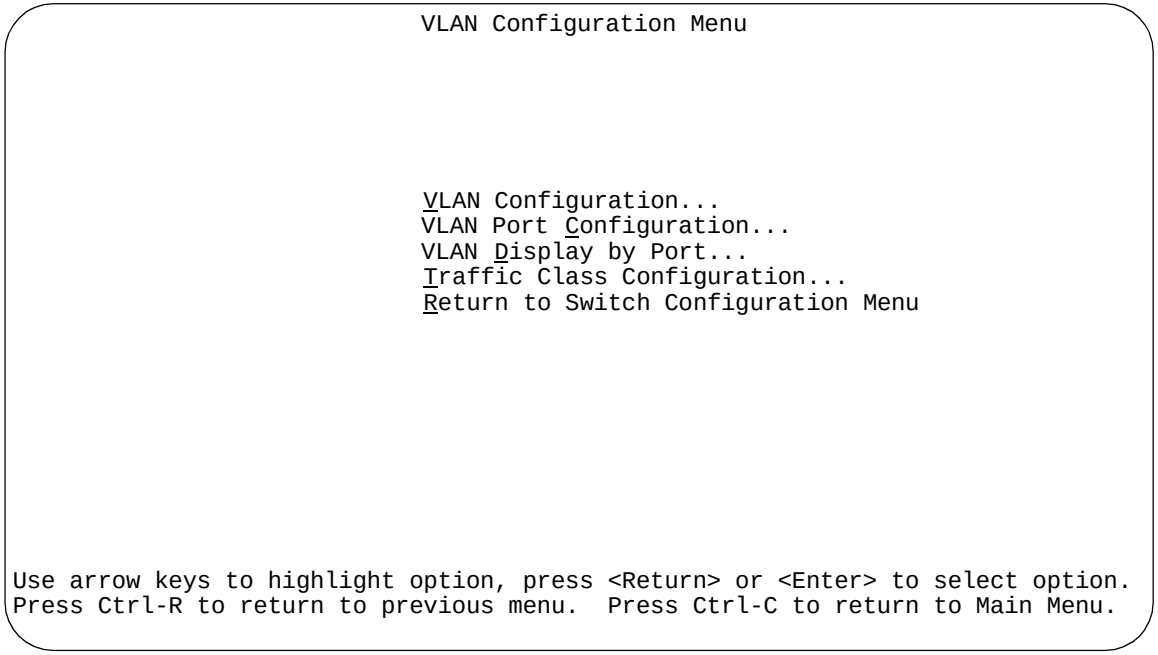

VLAN Configuration Menu
VLAN Configuration...
VLAN Port Configuration...
VLAN Display by Port...
Traffic Class Configuration...
Return to Switch Configuration Menu
Use arrow keys to highlight option, press <Return> or <Enter> to select option.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-8. VLAN Configuration Menu Screen

Table 3-7 describes the VLAN Configuration Menu screen options.

Table 3-7. VLAN Configuration Menu Screen Options

Option	Description
VLAN Configuration...	Displays the VLAN Configuration screen (see "VLAN Configuration" on page 3-24). This screen allows you to set up VLAN workgroups.
VLAN Port Configuration...	Displays the VLAN Port Configuration screen (see "VLAN Port Configuration" on page 3-30). This screen allows you to set up a specific switch port.
VLAN Display by Port...	Displays the VLAN Display by Port screen (see "VLAN Display by Port" on page 3-33).
Traffic Class Configuration...	Displays the Traffic Class Configuration screen (see "Traffic Class Configuration" on page 3-34).
Return to Switch Configuration Menu	Exits the VLAN Configuration Menu screen and displays the Switch Configuration Menu screen.

VLAN Configuration

The VLAN Configuration screen (Figure 3-9) allows you to assign *VLAN port memberships* to standalone or stacked unit ports. You can also create port-based VLANs and protocol-based VLANs:

- Port-based VLANs allow you to explicitly configure switch ports as VLAN port members.
- Protocol-based VLANs allow you to configure your switch ports as members of a broadcast domain, based on the protocol information within a packet.

  Protocol-based VLANs can localize broadcast traffic and assure that only the protocol-based VLAN ports are flooded with the specified protocol-type packets.

When you configure ports as VLAN port members, they become part of a set of ports that form a broadcast domain for a specific VLAN. You can assign switch ports, whether standalone or stacked unit ports, as VLAN port members of one or more VLANs.

You can assign VLAN port members attributes that allow the individual ports to operate in accordance with the IEEE 802.1Q tagging rules. You can define each of the VLAN port members as *tagged* or *untagged* (see “IEEE 802.1Q Tagging” on page 1-33 for a description of important terms used with 802.1Q VLANs).

You can also use this screen to create and to delete specific VLANs, to assign VLAN names, and to assign any VLAN as the management VLAN.

Choose VLAN Configuration (or press v) from the VLAN Configuration Menu screen to open the VLAN Configuration screen.

```
                        VLAN Configuration

  Create VLAN:     [    1 ]              VLAN Type:         [   Port-Based   ]
  Delete VLAN:     [      ]              Protocol Id (PID): [      None      ]
  VLAN Name:       [ VLAN #1 ]           User-Defined PID:  [ 0x0000 ]
  Management VLAN: [ Yes ]               VLAN State:        [     Active     ]

                          Port Membership
            1-6       7-12      13-18     19-24     25-28
           ------    ------    ------    ------    ------


 Unit #1   UUUUUU    UUUUUU    UUUUUU    UUUUUU    UUUU
 Unit #2   UUUUUU    UUUUUU    UUUUUU    UUUUUU
 Unit #3   UUUUUU    UUUUUU    UUUUUU    UUUUUU
 Unit #4   UUUUUU    UUUUUU    UUUUUU    UUUUUU




KEY: T = Tagged Port Member, U = Untagged Port Member, - = Not a Member of
VLAN
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-9. VLAN Configuration Screen

Table 3-8 describes the VLAN Configuration screen fields.

Table 3-8. VLAN Configuration Screen Fields

Field	Description
Create VLAN	Allows you to set up or view configured VLAN workgroups. Enter the number of the new VLAN you want to create or view, then press [Return]. The Port Membership fields indicate the corresponding VLAN workgroup configuration, if configured, or all dashes (-), indicating no VLAN Members configured. Alternatively, you can use the space bar to toggle through the various configured VLAN workgroups. You can create up to 64 different VLANs (including VLAN 1). Default 1 Range 2 to 4094

(continued)

Table 3-8. VLAN Configuration Screen Fields *(continued)*

Field	Description
Delete VLAN	Allows you to delete a specified VLAN, except the assigned management VLAN (see Management VLAN field). Enter the number of the VLAN you want to delete, then press [Return], or use the space bar to toggle through the selection until you reach the specific VLAN you want to delete, then press [Return]. The specified VLAN is deleted as soon as you press [Return]. The software does not prompt you to reconsider this action. If you delete a VLAN, all configuration parameters that are associated with that VLAN are deleted also. You cannot delete VLAN 1. By default, all switch ports are assigned as untagged members of VLAN 1 with all ports configured as PVID = 1. See “IEEE 802.1Q VLAN Workgroups” on page 1-32 for more information. Default: blank field Range: 2 to 4094
VLAN Name	Allows you to assign a name field to configured VLANs. Default: VLAN # (*VLAN number*) Range: Any ASCII string of up to 16 printable characters
Management VLAN	Allows you to assign any VLAN as the management VLAN. VLAN 1 is the default management VLAN for the switch. To set this field, the VLAN State field value must be Active, and the VLAN Type field value must be Port-Based or Protocol-Based (with the Protocol Id (PID) Field value set to IpEther2). Default: Yes Range: Yes, No
VLAN Type	Allows you to select the type of VLAN (port-based or protocol-based) to create. To set this field, the VLAN State field value must be Inactive. Default: Port-Based Range: Port-Based, Protocol-Based
Protocol Id (PID)	Allows you to set the protocol type of your protocol-based VLAN (to set this field, the VLAN State field value must be Inactive). You can choose from any of 15 predefined supported protocols (see “Predefined Protocol Identifier (PID) Description” on page 3-28), or you can create your own user-defined protocol-based VLAN (see the User-defined PID field description for more information). Default: None Range: None, Ip Ether2, Ipx 802.3, Ipx 802.2, Ipx Snap, Ipx Ether2, AplTk Ether2Snap, Declat Ether2, DecOth Ether2, Sna 802.2, Sna Ether2, NetBios 802.2, Xns Ether2, Vines Ether2, Ipv6 Ether2, User-Defined, Rarp Ether2

(continued)

Table 3-8. VLAN Configuration Screen Fields *(continued)*

Field	Description
User-defined PID	Allows you to create your own user-defined protocol-based VLAN where you specify the Protocol Identifier (PID) for the VLAN. To set this field, the VLAN State field must be set to Inactive (some restrictions apply, see "User-Defined Protocol Identifier (PID) Description" on page 3-29). Default 0x0000 Range Any 4-bit hexadecimal value (for example, 0xABCD)
VLAN State	Allows you to activate your newly created VLAN. The following associated field values: VLAN Type, Protocol Id (PID), and User-defined PID must be configured appropriately before this field can be set to Active. After you set the VLAN State field value to Active, you cannot change the VLAN Type, Protocol Id, or User-defined PID field values, unless you delete the VLAN. If you delete a VLAN, all configuration parameters that are associated with that VLAN are deleted also. Default Inactive Range Inactive, Active
Port Membership	Allows you to assign VLAN port memberships to *standalone* or *stacked unit* ports. The ports can be configured in one or more VLANs. To set this field, you must Set the VLAN State field value to Active. Certain restrictions apply for gigabit ports and when using the BayStack 410-24T switch ports as participants of Protocol-based VLANs (see "Gigabit Ports and BayStack 410-24T Switch Ports Restriction" on page 3-30). This field is dependent on the Tagging field value in the VLAN Port Configuration screen (see the Tagging field description in Table 3-11 on page 3-31). For example: • When the Tagging field is set to *Untagged Access*, you can set the Port Membership field as an untagged port member (U) or as a non-VLAN port member (-). • When the Tagging field is set to *Tagged Trunk*, you can set the Port Membership field as a tagged port member (T) or as a non-VLAN port member (-). The Port Membership fields are displayed in six-port groups (for example, 1-6, 7-12, 13-18). The number of ports displayed depends on the switch model or type of optional MDA installed in the Uplink Module slot. Default U (All ports are assigned as untagged members of VLAN 1.) Range U, T, and -

Predefined Protocol Identifier (PID) Description

Table 3-9 defines the standard protocol-based VLANS and PID types that are supported by the BayStack 410-24T switch:

Table 3-9. Prefined Protocol Identifier (PID)

PID Name	Encapsulation	PID Value (hex)	VLAN Type
Ip Ether2	Ethernet Type 2	0800, 0806	Standard IP on Ethernet Type 2 frames
Ipx 802.3	Ethernet 802.2	FF FF	Novell IPX on Ethernet 802.3 frames
Ipx 802.2	Ethernet 802.2	E0 E0	Novell IPX on Ethernet 802.2 frames
Ipx Snap	Ethernet Snap	8137, 8138	Novell IPX on Ethernet SNAP frames
Ipx Ether2	Ethernet Type 2	8137, 8138	Novell IPX on Ethernet Type 2 frames
AplTk Ether2Snap	Ethernet Type 2 or Ethernet Snap	809B, 80F3	AppleTalk on Ethernet Type 2 and Ethernet Snap frames
Declat Ether2	Ethernet Type 2	6004	DEC LAT protocol
DecOther Ether2	Ethernet Type 2	6000 - 6003, 6005 - 6009, 8038	Other DEC protocols
Sna 802.2	Ethernet 802.2	04 **, ** 04	IBM SNA on IEEE 802.2 frames
Sna Ether2	Ethernet Type 2	80D5	IBM SNA on Ethernet Type 2 frames
NetBios 802.2	Ethernet Type 2	F0 **, ** F0	NetBIOS Protocol
Xns Ether2	Ethernet Type 2	0600, 0807	Xerox XNS
Vines Ether2	Ethernet Type 2	0BAD	Banyan VINES
Ipv6 Ether2	Ethernet Type 2	86DD	IP version 6
User-Defined	Ethernet Type 2, Ethernet 802.2, or Ethernet Snap	User-defined 16-bit value	User-defined protocol-based VLAN (see "User-Defined Protocol Identifier (PID) Description" on page 3-29).
Rarp Ether2	Ethernet Type 2	8035	Reverse Address Resolution Protocol (RARP): RARP is a protocol used by some old diskless devices to obtain IP addresses by providing the MAC layer address. When you create a VLAN based on RARP, you can limit the RARP broadcasts to the ports that lead to the RARP server.

User-Defined Protocol Identifier (PID) Description

In addition to the standard *predefined* protocols, user-defined protocol-based VLANs are supported. For user-defined protocol-based VLANs, you specify the Protocol Identifier (PID) for the VLAN. Any frames that match the specified PID in any of the following ways are assigned to that user-defined VLAN:

- The ethertype for Ethernet Type 2 frames
- The PID in Ethernet SNAP frames
- The DSAP or SSAP value in Ethernet 802.2 frames

The following PIDs (see Table 3-10) are reserved and are not available for user-defined PIDs:

Table 3-10. Reserved PIDs

PID Value (hex)	Comments
04 **, ** 04	Sna 802.2
F0 **, ** F0	NetBios 802.2
AAAA	SNAP
0 - 05DC	Overlaps with 802.3 frame length
0600, 0807	Xns Ether2
0BAD	Vines Ether2
4242	IEEE 802.1D BPDUs
6000 - 6009, 8038	Dec
0800, 0806	Ip Ether2 (including Arp)
8035	Rarp Ether2
809B, 80F3	AplTk Ether2Snap
8100	IEEE 802.1Q for tagged frames
8137, 8138	Ipx
80D5	Sna Ether2
86DD	Ipv6 Ether2
8808	IEEE 802.3x pause frames
9000	Diagnostic loopback frame

Gigabit Ports and BayStack 410-24T Switch Ports Restriction

Gigabit ports and the BayStack 410-24T switch ports do not have the ability to assign incoming untagged frames to a protocol-based VLAN. To allow these types of ports to participate in protocol-based VLANs, you must set the following values for these ports:

1. **Set the Tagging field value in the VLAN Port Configuration screen to Tagged Trunk.**
2. **Set the Filter Untagged Frames field value to Yes.**

VLAN Port Configuration

The VLAN Port Configuration screen (Figure 3-10) allows you to configure specified switch ports with the appropriate PVID/VLAN association that enables the creation of VLAN broadcast domains (see “Shared Servers” on page 1-40 for more information about setting up VLAN broadcast domains).

You can configure specified switch ports to filter (discard) all received tagged frames, untagged frames, or unregistered frames (see “IEEE 802.1Q Tagging” on page 1-33).

You can also prioritize the order in which the switch forwards packets, on a per-port basis (see “IEEE 802.1p Prioritizing” on page 1-53).

Choose VLAN Port Configuration (or press c) from the VLAN Configuration Menu screen to open the VLAN Port Configuration screen.

```
                        VLAN Port Configuration

              Unit:                          [ 1 ]
              Port:                          [ 12  ]
              Filter Tagged Frames:          [ No  ]
              Filter Untagged Frames:        [ No  ]
              Filter Unregistered Frames:    [ No  ]
              Port Name:                     [ Unit 1, Port 12 ]
              PVID:                          [    1 ]
              Port Priority:                 [ 0 ]
              Tagging:                       [Untagged Access]




Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-10. VLAN Port Configuration Screen

Table 3-11 describes the VLAN Port Configuration screen fields.

Table 3-11. VLAN Port Configuration Screen Fields

Field	Description
Unit	Allows you to select the unit number (when stacking is configured) to view or configure. To view another unit, type its unit number and press [Enter], or press the spacebar to toggle the unit numbers. To find the unit number for a specific switch in the stack configuration, use the Identify Unit Numbers option (see Table 3-1 on page 3-5).
Port	Allows you to select the number of the port you want to view or configure. To view another port, type its port number and press [Enter], or press the spacebar to toggle the port numbers.
Filter Tagged Frames	Allows you to set this port to filter (discard) all received tagged packets. Default No Range No, Yes

(continued)

Table 3-11. VLAN Port Configuration Screen Fields *(continued)*

Field	Description
Filter Untagged Frames	Sets this port to filter (discard) all received untagged frames. **Restriction:** If this port is a gigabit port or a port that is a protocol-based VLAN member, you cannot set this field value to No. This restriction also applies if this port is a trunk member with a gigabit port or a port that is a protocol-based VLAN member. Default No Range No, Yes
Filter Unregistered Frames	Sets this port to filter (discard) all received unregistered packets. Default No Range No, Yes
Port Name	The default port name (with associated stack unit number when configured) assigned to this port. You can change this field to any name that is up to 16 characters long. Default Unit *x*, Port *x* Range Any ASCII string of up to 16 printable characters
PVID	Associates this port with a specific VLAN. For example, a port with a PVID of 3 assigns all untagged frames received on this port to VLAN 3. Default 1 Range 1 to 4094
Port Priority	Prioritizes the order in which the switch forwards packets received on specified ports (see “IEEE 802.1p Prioritizing” on page 1-53). Default 0 Range 0 to 7
Tagging	Allows you to assign VLAN Port Membership tagging options to this port, as follows: • Untagged Access: Any VLAN that this port is a member of *will not* be 802.1Q tagged. • Tagged Trunk: Any VLAN that this port is a member of will be 802.1Q tagged. **Restriction:** If this port is a gigabit port or a port that is a protocol-based VLAN member, you cannot set this field value to Untagged Access. This restriction also applies if this port is a trunk member with a gigabit port or a port that is a protocol-based VLAN member. *(continued)*

Table 3-11. VLAN Port Configuration Screen Fields *(continued)*

Field	Description
	The Port Membership field in the VLAN Configuration screen is dependent on the Tagging field value (see the Port Membership field description in Table 3-8 on page 3-25).
	Default Untagged Access
	Range Untagged Access, Tagged Trunk

VLAN Display by Port

The VLAN Display by Port screen (Figure 3-9) allows you to view VLAN characteristics associated with a specified switch port.

Choose VLAN Display by Port (or press d) from the VLAN Configuration Menu screen to open the VLAN Display by Port screen.

```
                          VLAN Display by Port

                     Unit:                [ 1  ]
                     Port:                [ 12 ]
                     PVID:                  1
                     Port Name:           Unit 1, Port 12

  VLANs        VLAN Name                   VLANs        VLAN Name
---------  ----------------              ---------  ----------------
    1      VLAN #1



Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-11. VLAN Display by Port Screen

Table 3-12 describes the VLAN Display by Port screen fields.

Table 3-12. VLAN Display by Port Screen Fields

Field	Description
Unit	Allows you to select the unit number (when stacking is configured) to view. To view another unit, type its unit number and press [Enter], or press the spacebar to toggle the unit numbers.
Port	Allows you to select the number of the port you want to view. To view another port, type its port number and press [Enter], or press the spacebar on your keyboard to toggle the port numbers.
PVID	Read-only field that indicates the PVID setting for the specified port.
Port Name	Read-only field that indicates the port name assigned to the specified port.
VLANs	Column header for the read-only fields listing the VLANs associated with the specified port.
VLAN Name	Column header for the read-only fields listing the VLAN Names associated with the specified port.

Traffic Class Configuration

The Traffic Class Configuration screen (Figure 3-12) allows you to assign a Low or High traffic classification to any of eight (0 to 7) user_priority values assigned to a received frame on specified switch ports.

Note: If you change the Traffic Class Configuration for any switch in a stack configuration, the entire stack resets with the current configuration settings (see Table 3-1 on page 3-5 for details of the Reset option).

See “IEEE 802.1p Prioritizing” on page 1-53 for more information about this screen.

Choose Traffic Class Configuration (or press t) from the VLAN Configuration Menu screen to open the Traffic Class Configuration screen.

```
                        Traffic Class Configuration


                 User Priority              Traffic Class
                 -------------              -------------
                   Priority 0:                [ Low  ]
                   Priority 1:                [ Low  ]
                   Priority 2:                [ Low  ]
                   Priority 3:                [ Low  ]
                   Priority 4:                [ Low  ]
                   Priority 5:                [ Low  ]
                   Priority 6:                [ Low  ]
                   Priority 7:                [ Low  ]


Changing the priorities of the traffic classes will cause an automatic
Reset to Current Settings to occur across the entire stack.
The current configuration will be adapted to the new set of priorities

Are you sure you want to change priorities to the new settings?  [ No  ]

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-12. Traffic Class Configuration Screen

Table 3-13 describes the Traffic Class Configuration screen fields.

Table 3-13. Traffic Class Configuration Screen Fields

Field	Description
User Priority	Column header for the read-only fields that indicate the user-priority values from priority 0 to priority 7. These values are derived from the three-bit field in the header of 802.1Q tagged frames (see “IEEE 802.1Q Tagging” on page 1-33).
Traffic Class	Column header for the eight user-configurable fields that correspond to the adjacent user priority levels. Default Low Range Low, High

Port Configuration

The Port Configuration screen (Figure 3-13 and Figure 3-14) allows you to configure specific switch ports or all switch ports. You can enable or disable the port status of specified switch ports, set (optional) MDA ports to autonegotiate for the highest available speed of the connected station, and you can set the duplex mode for specific ports (autonegotiation is not supported on fiber optic ports).

You can disable switch ports that are trunk members; however, the screen prompts for verification of the request before completing the action. Choosing [Yes] disables the port and removes it from the trunk.

Note: The Autonegotiation fields, the Link Trap, the Speed fields, and the Duplex fields are independent of MultiLink trunking, rate limiting, VLANs, IGMP Snooping, and the STP.

Choose Port Configuration (or press p) from the Switch Configuration Menu screen to open the Port Configuration screen.

```
                              Port Configuration
                                 Unit:  [ 1 ]
Port   Trunk    Status      Link   LnkTrap  Autonegotiation   Speed  Duplex
 ----   -----  ------------  -----  -------  ---------------   -----------------
    1          [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Half ]
    2          [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 10Mbs  / Full ]
    3          [ Enabled  ]   Up    [ Off ]   [ Disabled ]     [ 10Mbs  / Full ]
    4          [ Enabled  ]   Up    [ Off ]   [ Disabled ]     [ 100Mbs / Half ]
    5          [ Enabled  ]   Down  [ On  ]   [ Disabled ]     [ 100Mbs / Half ]
    6      1   [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    7      1   [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    8          [ Enabled  ]   Down  [ Off ]   [ Disabled ]     [ 100Mbs / Half ]
    9      1   [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
   10          [ Enabled  ]   Down  [ On  ]   [ Disabled ]     [ 100Mbs / Half ]
   11          [ Enabled  ]   Up    [ Off ]   [ Disabled ]     [ 10Mbs  / Half ]
   12          [ Enabled  ]   Up    [ Off ]   [ Disabled ]     [ 10Mbs  / Half ]
   13      2   [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
   14      2   [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]

                                                                    More...

Press Ctrl-N to display choices for additional ports..
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-13. Port Configuration Screen (1 of 2)

```
                              Port Configuration
                                Unit:  [ 1 ]
Port   Trunk    Status       Link   LnkTrap  Autonegotiation   Speed  Duplex
 ----   -----  ------------  -----  -------  ---------------   -----------------
    15          [ Enabled  ]   Down  [ Off ]   [ Disabled ]     [ 10Mbs  / Full ]
    16          [ Enabled  ]   Down  [ Off ]   [ Disabled ]     [ 10Mbs  / Full ]
    17       1  [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    18          [ Enabled  ]   Down  [ On  ]   [ Disabled ]     [ 100Mbs / Half ]
    19       3  [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    20       3  [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    21          [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Half ]
    22       4  [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    23       4  [ Enabled  ]   Up    [ On  ]   [ Enabled  ]     [ 100Mbs / Full ]
    24          [ Enabled  ]   Down  [ On  ]   [ Disabled ]     [ 10Mbs  / Half ]
    25          [ Enabled  ]   Up    [ Off ]   [ Enabled  ]     [ 100Mbs / Half ]
    26          [ Enabled  ]   Up    [ Off ]   [ Disabled ]     [ 100Mbs / Half ]
    27          [ Enabled  ]   Down  [ Off ]   [ Disabled ]     [ 100Mbs / Half ]
    28          [ Enabled  ]   Down  [ On  ]   [ Disabled ]     [ 100Mbs / Half ]
Switch          [ Enable   ]        [ On  ]   [ Enabled  ]     [ 100Mbs / Half ]


Press Ctrl-P to display choices for ports 1-14.
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-14. Port Configuration Screen (2 of 2)

Table 3-14 describes the Port Configuration screen fields.

Table 3-14. Port Configuration Screen Fields

Field	Description
Unit	Allows you to select the unit number (when stacking is configured) to view or configure. To view or configure another unit, type its unit number and press [Enter], or press the spacebar to toggle the unit numbers.
Port	Indicates the switch port numbers that correspond to the field values in that row of the screen (for example, the field values in row 2 apply to switch port 2). The values that you set in the *Switch* row will affect all switch ports and, when the switch is part of a stack, the values that you set in the *Stack* row will affect all ports in the entire stack.
Trunk	The read-only data displayed in this column indicates the trunks that correspond to the switch ports specified in the Trunk Members fields of the Trunk Configuration screen (see “"MultiLink Trunk Configuration” on page 3-41).

(continued)

Table 3-14. Port Configuration Screen Fields *(continued)*

Field	Description
Status	Allows you to disable any of the switch ports. You can also use this field to control access to any switch port. Default Value Enabled Range Enabled, Disabled
Link	A read-only field that indicates the current link state of the corresponding port, as follows: • Up: The port is connected and operational. • Down: The port is not connected or is not operational.
LnkTrap	Allows you to control whether link up/link down traps are sent to the configured trap sink from the switch. Default Value On Range On, Off
Autonegotiation	When enabled, sets the corresponding port speed to match the best service provided by the connected station (up to 100 Mb/s in full-duplex mode when a 10/100 MDA is installed). This field is disabled for all fiber optic ports. Default Value Enabled Range Enabled, Disabled
Speed/Duplex[1]	Allows you to manually configure any port to support an Ethernet speed of 10 Mb/s in half- or full-duplex mode. When a 10/100 MDA is installed, you can manually configure the MDA ports to support 10 Mb/s or 100 Mb/s in half- or full-duplex mode. Default Value 10Mbs/Half (when Autonegotiation is Disabled) Range 10Mbs/Half, 10Mbs/Full, 100Mbs/Half, 100Mbs/Full

1 Fiber optic ports can only be set to 100Mbs/Half or 100Mbs/Full.

High Speed Flow Control Configuration

The High Speed Flow Control Configuration screen (Figure 3-15) allows you to set the port parameters for any gigabit MDA that may be configured in a stack configuration.

Note: The BayStack 410-24T switch does not support gigabit MDAs; however, this screen will appear if the BayStack 410-24T switch is part of a stack configuration, and *only* if a gigabit MDA is installed in any stack unit.

Choose High Speed Flow Control Configuration (or press h) from the Switch Configuration Menu screen to open the High Speed Flow Control Configuration screen.

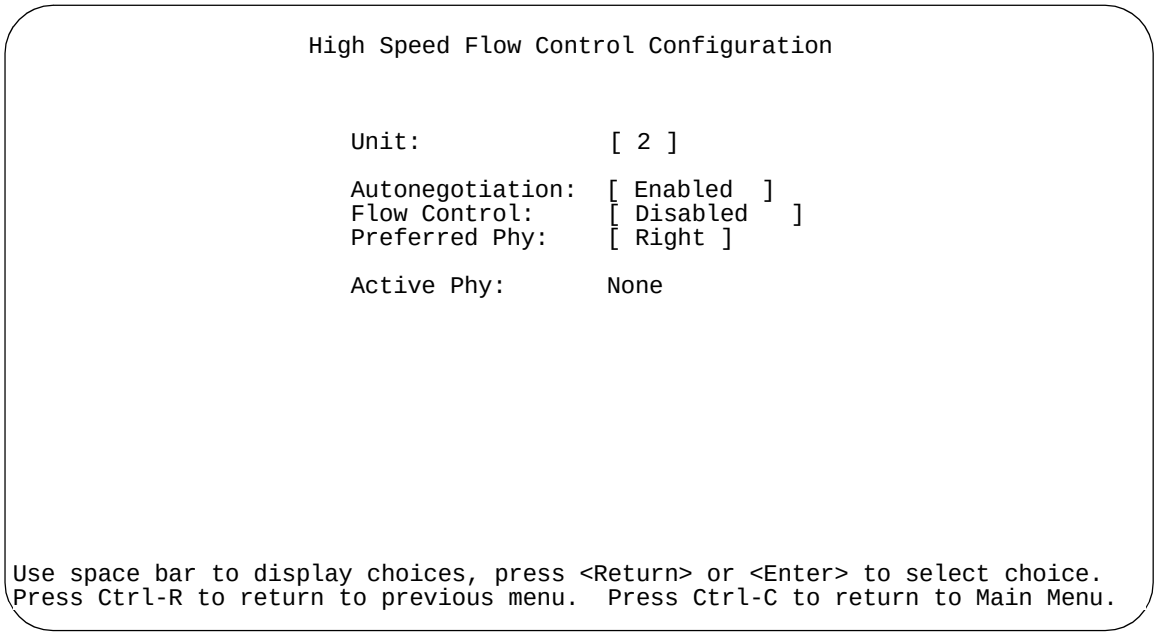

High Speed Flow Control Configuration
Unit: [2]
Autonegotiation: [Enabled]
Flow Control: [Disabled]
Preferred Phy: [Right]
Active Phy: None
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-15. High Speed Flow Control Configuration Screen

Table 3-15 describes the High Speed Flow Control Configuration screen fields.

Table 3-15. High Speed Flow Control Configuration Screen Fields

Field	Description
Unit	Allows you to select the unit number (when stacking is configured) to view or configure. To view or configure another unit, type its unit number and press [Enter], or press the spacebar to toggle the unit numbers (the system only displays a screen for units that are configured with a gigabit MDA).
Autonegotiation	When enabled, the port only advertises support for 1000 Mb/s operation, in full-duplex mode. Default Value Enabled Range Enabled, Disabled

(continued)

Table 3-15. High Speed Flow Control Configuration Screen Fields *(continued)*

Field	Description
Flow Control	Allows you to control traffic and avoid congestion on the gigabit MDA port. Two modes are available (see "Choosing a High Speed Flow Control Mode" on page 3-40 for details about the two modes). Autonegotiation must be disabled for this port when using this feature. Default Value Disabled Range Disabled, Symmetric, Asymmetric
	Note: The following two fields only appear when a (single MAC) MDA with a separate redundant Phy port is installed.
Preferred Phy	Allows you to choose the preferred Phy port; the other Phy port reverts to backup. Default Value Right Range Right, Left
Active Phy	Indicates the operational Phy port. Default Value: None Range: None, Right, Left

Choosing a High Speed Flow Control Mode

The High Speed Flow Control feature allows you to control traffic and avoid congestion on the gigabit full-duplex link. If the receive port buffer becomes full, the BayStack 410-24T switch issues a flow-control signal to the device at the other end of the link to suspend transmission. When the receive buffer is no longer full, the switch issues a signal to resume the transmission. You can choose Symmetric or Asymmetric flow-control mode:

Symmetric Mode

This mode allows both the gigabit MDA port and its link partner to send flow-control *pause* frames to each other. When a pause frame is received (by either the gigabit MDA port or its link partner), the port suspends transmission of frames for a number of slot times specified in the control frame or until a pause-release control frame is received. Both devices on the link must support this mode when it is selected.

Asymmetric

This mode allows the link partner to send flow control pause frames to the gigabit MDA port. When a pause frame is received, the receiving port suspends transmission of frames for a number of slot times specified in the control frame or until a pause-release control frame is received.

In this mode the gigabit MDA port is disabled from transmitting pause frames to its link partner. Use this mode when the gigabit MDA port is connected to a buffered repeater device.

MultiLink Trunk Configuration

The MultiLink Trunk Configuration Menu screen (Figure 3-16) allows you to select the appropriate screen to configure up to six MultiLink trunks (you can group up to four switch ports together to form each trunk).

You can configure up to six MultiLink trunks in each stack, with trunk members in either a single unit or distributed between units within the stack configuration (distributed trunking).

You can monitor the bandwidth usage for the trunk member ports within each trunk. For more information about configuring MultiLink Trunks, see ““MultiLink Trunks” on page 1-57.

Note: When a trunk is not active (Trunk Status field set to Disabled), configuration changes do not take effect until you set the Trunk Status field to Enabled.

Choose MultiLink Trunk Configuration (or press t) from the Switch Configuration Menu screen to open the MultiLink Trunk Configuration Menu screen.

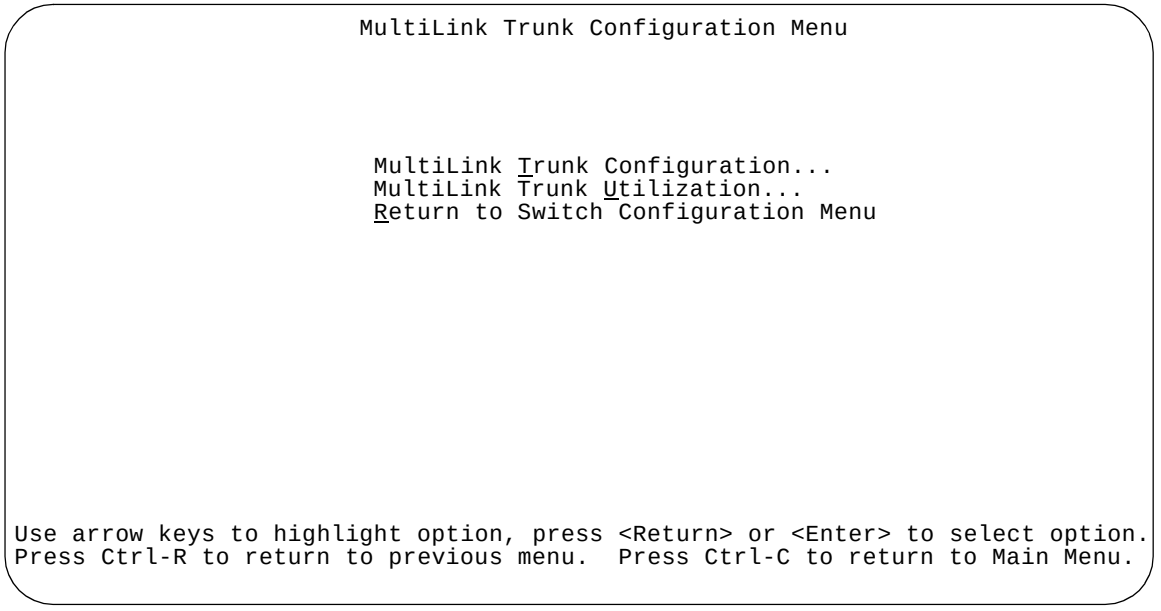

MultiLink Trunk Configuration Menu
MultiLink Trunk Configuration...
MultiLink Trunk Utilization...
Return to Switch Configuration Menu
Use arrow keys to highlight option, press <Return> or <Enter> to select option.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-16. MultiLink Trunk Configuration Menu Screen

Table 3-16 describes the MultiLink Trunk Configuration Menu screen options.

Table 3-16. MultiLink Trunk Configuration Menu Screen Options

Option	Description
MultiLink Trunk Configuration...	Displays the MultiLink Trunk Configuration screen (Figure 3-17). This screen allows you to configure up to six MultiLink trunks within a standalone switch or within a stack configuration. You can group up to four switch ports together to form each trunk.
MultiLink Trunk Utilization...	Displays the MultiLink Trunk Utilization screen (Figure 3-18 and Figure 3-19). This screen allows you to monitor the bandwidth utilization of the configured trunks.
Return to Switch Configuration Menu	Exits the MultiLink Trunk Configuration Menu screen and displays the Switch Configuration Menu screen.

MultiLink Trunk Configuration Screen

The MultiLink Trunk Configuration screen (Figure 3-17) allows you to configure up to six trunks in a standalone switch or stack. In a stack configuration, trunk members can be distributed between any of the units within the same stack configuration.

Any mix of up to eight BayStack 410-24T switches and BayStack 450 switches can be stacked to provide a total of 224 ports (when all MDA slots are configured with the maximum port availability).

Figure 3-17 shows six trunks in a stack configuration:

- Trunk 1 has four trunk members in unit 3.
- Trunks 2, 3, 4, and 5 each have two trunk members in individual units.
- Trunk 6 has four trunk members *distributed into four separate units* of the stack.

When the trunks are enabled, the trunk members take on default settings necessary for correct operation of the MultiLink Trunking feature. These default settings can affect the correct operation of your configured network. If you disable a trunk, you may need to reconfigure the specific trunk members switch ports to return to the previous switch configuration. See ““MultiLink Trunks” on page 1-57 for more information.

Choose Trunk Configuration (or press t) from the MultiLink Trunk Configuration Menu screen to open the MultiLink Trunk Configuration screen.

```
                          MultiLink Trunk Configuration

Trunk    Trunk Members (Unit/Port)    STP Learning   Trunk Mode    Trunk Status
-----  ------------------------------ ------------ --------------- ------------
  1   [ 3/6  ][ 3/7  ][ 3/9  ][ 3/17 ] [ Normal   ]      Basic      [ Enabled  ]
  2   [ 4/25 ][ 4/26 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  3   [ 6/13 ][ 6/14 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  4   [ 5/19 ][ 5/20 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  5   [ 8/22 ][ 8/23 ][  /   ][  /   ] [ Normal   ]      Basic      [ Enabled  ]
  6   [ 3/2  ][ 1/2  ][ 7/2  ][ 5/6  ] [ Normal   ]      Basic      [ Disabled ]

Trunk     Trunk Name
-----  ------------------
  1   [ U3:T1 to FS2]
  2   [ U4:T2 to S2]
  3   [ U6:T3 to S2]
  4   [ U5:T4 to S3]
  5   [ U8:T5 to S4]
  6   [ Distributed Trunk]


Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-17. MultiLink Trunk Configuration Screen

Table 3-17 describes the MultiLink Trunk Configuration screen fields.

Table 3-17. MultiLink Trunk Configuration Screen Fields

Field	Description
Trunk	Column header for the read-only fields in this screen. The read-only data displayed in the Trunk column indicates the trunk (1 to 6) that corresponds to the switch ports specified in the user-configurable Trunk Members fields.
Trunk Members (Unit/Port)	The Trunk Members column contains fields in each row that can be configured to create the corresponding trunk. The Unit value in the (Unit/Port) field is configurable only when the switch (unit) is part of a stack configuration. It indicates that the trunk members in this row are associated with the specified unit number configured in the Unit field. Each switch port can only be a member of a single trunk. The appropriate trunk number for each trunk member configured within this field is shown adjacent to the corresponding switch port in the following screens: Port Configuration screen, and Spanning Tree Configuration screen. Default Value blank field Range 1 to 8 or 1 to 28 (depending on model type)

(continued)

Table 3-17. MultiLink Trunk Configuration Screen Fields *(continued)*

Field	Description
STP Learning	The STP Learning column contains a single field for each row that, when enabled, allows the specified trunk to participate in the spanning tree. This setting overrides those of the individual trunk members. Fast is the same as Normal, except that the state transition timer is shortened to two seconds. Default Value Normal Range Normal, Fast, Disabled
Trunk Mode	The Trunk Mode column contains a single read-only field for each row that indicates the default operating mode for the switch. **Basic:** Basic mode is the default mode for the switch. When in this mode, source MAC addresses are dynamically assigned to specific trunk members for flooding and forwarding. This allows the switch to stabilize and distribute the data streams of source addresses across the trunk members.
Trunk Status	The Trunk Status column contains a single field for each row that allows users to enable or disable any of the trunks. Default Value Disabled Range Enabled, Disabled
Trunk Name	The Trunk Name column contains a single optional field in each row that can be used to assign names to the corresponding configured trunks. The names chosen for this example can provide meaningful information to the user (for example, S1:T1 to FS2 indicates Trunk 1 in switch S1 connects to File Server 2).

MultiLink Trunk Utilization Screen

The MultiLink Trunk Utilization screen (Figure 3-18 and Figure 3-19) allows you to monitor the percentage of bandwidth used by configured trunk members. You can choose the type of traffic to monitor.

Figure 3-18 shows an *example* of bandwidth utilization rates for the trunk member ports configured in Figure 3-17. Because two screens are required to show all of the configured trunks (up to six), the screen prompts users to Press [Ctrl]-N to view trunks five and six.

Choose MultiLink Trunk Utilization (or press u) from the MultiLink Trunk Configuration Menu screen to open the MultiLink Trunk Utilization screen.

```
                          MultiLink Trunk Utilization

Trunk   Traffic Type    Unit/Port   Last 5 Minutes  Last 30 Minutes   Last Hour
-----   -------------   ---------   --------------  ---------------   ---------
  1     [ Rx and Tx ]      3/6         90.0%             70.0%          90.0%
                           3/7         20.0%             55.0%          80.0%
                           3/9         35.0%             45.0%          45.0%
                           3/17        85.0%             35.0%          20.0%
  2     [ Rx and Tx ]      4/25        45.0%             45.0%          50.0%
                           4/26        25.0%             70.0%          35.0%


  3     [ Rx and Tx ]      6/13        35.0%             35.0%          50.0%
                           6/14        30.0%             80.0%          70.0%


  4     [ Rx and Tx ]      5/19        40.0%             35.0%          75.0%
                           5/20        25.0%             70.0%          85 0%



                                                                        More...
Press Ctrl-N to display utilization for trunks 5-6.
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-18. MultiLink Trunk Utilization Screen (1 of 2)

```
                          MultiLink Trunk Utilization

Trunk   Traffic Type    Unit/Port   Last 5 Minutes  Last 30 Minutes   Last Hour
-----   -------------   ---------   --------------  ---------------   ---------
  5     [ Rx and Tx ]      8/22         45.0%             35.0%          50.0%
                           8/23         55.0%             25.0%          70.0%


  6     [ Rx and Tx ]      3/2          65.0%             30.0%          55.0%
        [ Rx and Tx ]      1/2          45.0%             50.0%          35.0%
        [ Rx and Tx ]      7/2          25.0%             40.0%          50.0%
        [ Rx and Tx ]      5/6          75.0%             80.0%          55.0%









Press Ctrl-P to display utilization for trunks 1-4.
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-19. MultiLink Trunk Utilization Screen (2 of 2)

Table 3-18 describes the MultiLink Trunk Utilization screen fields.

Table 3-18. MultiLink Trunk Utilization Screen Fields

Field	Description
Trunk	Column header for the read-only fields in this screen. The read-only data displayed in this column indicates the trunk (1 to 6) that corresponds to the switch ports specified in the Port field.
Traffic Type	Allows you to choose the traffic type to be monitored for percent of bandwidth utilization (see Range). Default Value Rx and Tx Range Rx and Tx, Rx, Tx
Unit/Port	Lists the trunk member ports that correspond to the trunk specified in the Trunk column. The (Unit/) extension to the Port column name only appears when the switch (unit) is part of a stack configuration. It indicates that the ports in this row are associated with the specified unit number configured in the Unit field.

(continued)

Table 3-18. MultiLink Trunk Utilization Screen Fields *(continued)*

Field	Description
Last 5 Minutes	This read-only field indicates the percentage of packets (of the type specified in the Traffic Type field) utilized by the port in the last five minutes. This field provides a running average of network activity and is updated every 15 seconds.
Last 30 Minutes	This read-only field indicates the percentage of packets (of the type specified in the Traffic Type field) utilized by the port in the last thirty minutes. This field provides a running average of network activity and is updated every 15 seconds.
Last Hour	This read-only field indicates the percentage of packets (of the type specified in the Traffic Type field) utilized by the port in the last hour. This field provides a running average of network activity and is updated every 15 seconds.

Port Mirroring Configuration

The Port Mirroring Configuration screen allows you to configure a specific switch port to monitor up to two specified ports or two MAC addresses. You can specify port-based monitoring or address-based monitoring. In a stack configuration, you can monitor ports that reside on different units within the stack.

For more information about the port mirroring feature, see ““Port Mirroring (Conversation Steering)” on page 1-76.

Figure 3-20 shows an example of a Port Mirroring Configuration screen, in a stack configuration, where port 12 (in stack unit 3) is designated as the monitoring port for ports 5 and 6 of stack unit 4. When installed as a standalone switch, the screen does not display the (Unit/) field designation.

Choose Port Mirroring Configuration (or press i) from the Switch Configuration Menu screen to open the Port Mirroring Configuration screen.

```
                        Port Mirroring Configuration


                     Monitoring Mode:  [  -> Port X   or    Port Y ->  ]
                   Monitor Unit/Port:  [ 3/12 ]

                          Unit/Port X:  [ 4/5  ]
                          Unit/Port Y:  [ 4/6  ]

                            Address A:  [ 00-00-00-00-00-00 ]
                            Address B:  [ 00-00-00-00-00-00 ]



Port mirroring configuration has taken effect.

                  Currently Active Port Mirroring Configuration
                  ---------------------------------------------
Monitoring Mode:  -> Port X   or    Port Y ->    Monitor Unit:  3 Port: 12
Unit X:  4  Port X:  5   Unit Y:  4  Port Y:  6

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-20. Port Mirroring Configuration Screen

Table 3-19 describes the Port Mirroring Configuration screen fields.

Table 3-19. Port Mirroring Configuration Screen Fields

Field	Description
Monitoring Mode	Allows you to select any one of six port-based monitoring modes or any one of five address-based monitoring modes (see Table 3-20). Selecting any one of the six *port-based modes* activates the port X and port Y screen fields, where you can choose up to two ports to monitor. Selecting any one of the five *address-based modes* activates the Address A and Address B screen fields, where you can specify MAC addresses to monitor. Default Value Disabled Range See Table 3-20

(continued)

Table 3-19. Port Mirroring Configuration Screen Fields *(continued)*

Field	Description	
Monitor Unit/Port	Indicates the port number (of the specified unit) that is designated as the monitor port.	
	Default Value	Zero-length string
	Range	1 to 8 / 1 to 28 (depending on model type)
Unit/Port X	Indicates one of the ports (of the specified unit) that will be monitored by the designated port monitor when one of the port-based monitoring modes is selected. This port will be monitored according to the value X in the Monitoring Mode field (see Table 3-20).	
	Default Value	Zero-length string
	Range	1 to 8 / 1 to 28 (depending on model type)
Unit/Port Y	Indicates one of the ports (of the specified unit) that will be monitored by the designated port monitor when one of the port-based monitoring modes is selected. When installed as a standalone switch, the screen does not display the (Unit/) field designation. This port will be monitored according to the value Y in the Monitoring Mode field (see Table 3-20).	
	Default Value	Zero-length string
	Range	1 to 8 / 1 to 28 (depending on model type)
Address A	Indicates the MAC addresses that will be monitored by the designated port monitor when one of the address-based monitoring modes is selected. This port will be monitored according to the value “Address A” in the selected Monitoring Mode field (see Table 3-20). Users can enter the MAC address from this screen or from the MAC Address Table screen. The entry is displayed and can be modified by either screen (see ““MAC Address Table” on page 3-19).	
	Default Value	00-00-00-00-00-00 (no MAC address assigned)
	Range	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF
Address B	Indicates the MAC addresses that will be monitored by the designated port monitor when one of the address-based monitoring modes is selected. This port will be monitored according to the value “Address B” in the selected Monitoring Mode field (see Table 3-20). Users can enter the MAC address from this screen or from the MAC Address Table screen. The entry is displayed and can be modified by either screen (see “MAC Address Table” on page 3-19).	
	Default Value	00-00-00-00-00-00 (no MAC address assigned)
	Range	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF

Table 3-20 describes the various monitoring modes available from the Port Mirroring Configuration screen.

Table 3-20. Monitoring Modes

Fields	Description
Port-based:	
Disabled	Default value for this feature.
-> Port X	Monitor all traffic received by Port X.
Port X ->	Monitor all traffic transmitted by Port X.
<-> Port X	Monitor all traffic received and transmitted by Port X.
-> Port X or Port Y ->	Monitor all traffic received by Port X or transmitted by Port Y.
-> Port X and Port Y ->	Monitor all traffic received by Port X (destined to Port Y) and then transmitted by Port Y.
<-> Port X and Port Y <->	Monitor all traffic received/transmitted by Port X and received/ transmitted by Port Y.
Address-based:	
Disabled	Default value for this feature.
Address A -> any Address	Monitor all traffic transmitted from Address A to any address.
any Address -> Address A	Monitor all traffic received by Address A from any address.
<-> Address A	Monitor all traffic received by or transmitted by Address A.
Address A -> Address B	Monitor all traffic transmitted by Address A to Address B.
Address A <-> Address B	Monitor all traffic between Address A and Address B (conversation between the two stations).

Rate Limiting Configuration

The Rate Limiting Configuration screen allows you to limit the forwarding rate of broadcast and multicast packets.

Figures 3-21 and 3-22 show sample rate limiting values for the two Rate Limiting Configuration screens.

Note: If a port is configured for rate limiting, and it is a MultiLink trunk member, all trunk member ports implement rate limiting. Also, if a trunk member is implementing rate limiting and the port is disabled from rate limiting, all trunk members are disabled from rate limiting.

Choose Rate Limiting Configuration (or press l) from the Switch Configuration Menu screen to open the Rate Limiting Configuration screen.

```
                        Rate Limiting Configuration
                                Unit:  [ 1 ]
 Port     Packet Type      Limit     Last 5 Minutes   Last Hour   Last 24 Hours
 ----   -------------   --------   --------------   ---------   -------------
   1    [ Both      ]   [ None ]        56.0%          22.0%         23.0%
   2    [ Multicast ]   [  9%  ]        30.0%          27.0%         55.0%
   3    [ Both      ]   [ None ]        25.0%          24.0%         67.0%
   4    [ Both      ]   [ 10%  ]        72.0%          33.0%         55.0%
   5    [ Broadcast ]   [ 10%  ]        35.0%          54.0%         78.0%
   6    [ Multicast ]   [ 10%  ]        96.0%          45.0%         87.0%
   7    [ Both      ]   [ 10%  ]        86.0%          67.0%         60.0%
   8    [ Both      ]   [  5%  ]        58.0%          44.0%         70.0%
   9    [ Multicast ]   [ None ]        11.0%          87.0%         65.0%
  10    [ Both      ]   [ None ]        27.0%          89.0%         44.0%
  11    [ Both      ]   [ None ]        15.0%          66.0%         66.0%
  12    [ Both      ]   [ None ]        12.0%          98.0%         99.0%
  13    [ Both      ]   [ None ]        44.0%          33.0%         89.0%
  14    [ Both      ]   [ None ]        34.0%          45.0%         76.0%
                                                                     More...

Press Ctrl-N to display choices for additional ports..
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-21. Rate Limiting Configuration Screen (1 of 2)

```
                        Rate Limiting Configuration
                                Unit:  [ 1 ]
  Port    Packet Type     Limit     Last 5 Minutes   Last Hour   Last 24 Hours
  ----   -------------   --------   --------------   ---------   -------------
   15    [ Both      ]   [ None ]        44.0%          56.0%          0.0%
   16    [ Both      ]   [ None ]        67.0%          34.0%          0.0%
   17    [ Multicast ]   [ 10%  ]        65.0%          48.0%         45.0%
   18    [ Both      ]   [ None ]        77.0%          74.0%         60.0%
   19    [ Both      ]   [ 10%  ]        80.0%          89.0%         90.0%
   20    [ Both      ]   [ None ]        78.0%          83.0%         98.0%
   21    [ Broadcast ]   [ None ]        98.0%          88.0%         44.0%
   22    [ Both      ]   [ None ]        34.0%          93.0%          0.0%
   23    [ Both      ]   [ None ]        65.0%          82.0%         56.0%
   24    [ Multicast ]   [ None ]        76.0%          65.0%         50.0%
   25    [ Both      ]   [  5%  ]        88.0%          67.0%          0.0%
   26    [ Both      ]   [ None ]        35.0%          45.0%         90.0%
   27    [ Both      ]   [ None ]        25.0%          48.0%         78.0%
   28    [ Both      ]   [ None ]        17.0%          77.0%         89.0%
  Switch[ Both      ]   [ None ]
  Stack [ Both      ]   [ None ]

Press Ctrl-P to display choices for ports 1-14.
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-22. Rate Limiting Configuration Screen (2 of 2)

You can use this screen to view the percentage of either packet type (or both packet types) received on each port.

When the volume of either packet type is high, placing severe strain on the network (often referred to as a “storm”), you can set the forwarding rate of those packet types to *not exceed* a specified percentage of the total available bandwidth.

Table 3-21 describes the Rate Limiting Configuration screen fields.

Table 3-21. Rate Limiting Configuration Screen Fields

Field	Description
Unit	Only appears if the switch is participating in a stack configuration. The field allows you to select the number of the unit you want to view or configure. To view or configure another unit, type its unit number and press [Enter], or press the spacebar on your keyboard to toggle the unit numbers.
Port	Indicates the switch port numbers that correspond to the field values in that row of the screen (for example, the field values in row 2 apply to switch port 2). Note that the values applied in the All row (bottom row) affect all switch ports.
Packet Type	Allows you to select the packet types for rate limiting or viewing. Default Value Both Range Both, Multicast, Broadcast
Limit	Sets the percentage of port bandwidth allowed for forwarding the packet types specified in the Packet Type field. When the threshold is exceeded, any additional packets (specified in the Packet Type field) are discarded[1]. Default Value None Range None, 10%, 9%, 8%, 7%, 6%, 5%, 4%, 3%, 2%, 1%
Last 5 Minutes	This read-only field indicates the percentage of packets (of the type specified in the Packet Type field) received by the port in the last five minutes. This field provides a running average of network activity and is updated every 15 seconds. Note that this field indicates the receiving port's view of network activity, regardless of the rate-limiting setting.
Last Hour	This read-only field indicates the percentage of packets (of the type specified in the Packet Type field) received by the port in the last hour. This field provides a running average of network activity and is updated every five minutes. Note that this field indicates the receiving port's view of network activity, regardless of the rate-limiting setting.
Last 24 Hours	This read-only field indicates the percentage of packets (of the type specified in the Packet Type field) received by the port in the last 24 hours. This field provides a running average of network activity and is updated every hour. Note that this field indicates the receiving port's view of network activity, regardless of the rate-limiting setting.

1 Rate limiting is disabled if this field is set to None. This allows you to select and view the percentage of specific packet types present in the network, without inadvertently limiting the forwarding rate.

IGMP Configuration Menu

The IGMP Configuration Menu screen (Figure 3-23) allows you to select the appropriate screen to optimize IP multicast packets in a bridged Ethernet environment (see "IGMP Snooping" on page 1-48).

Choose IGMP Configuration (or press g) from the Switch Configuration Menu screen to open the IGMP Configuration Menu screen.

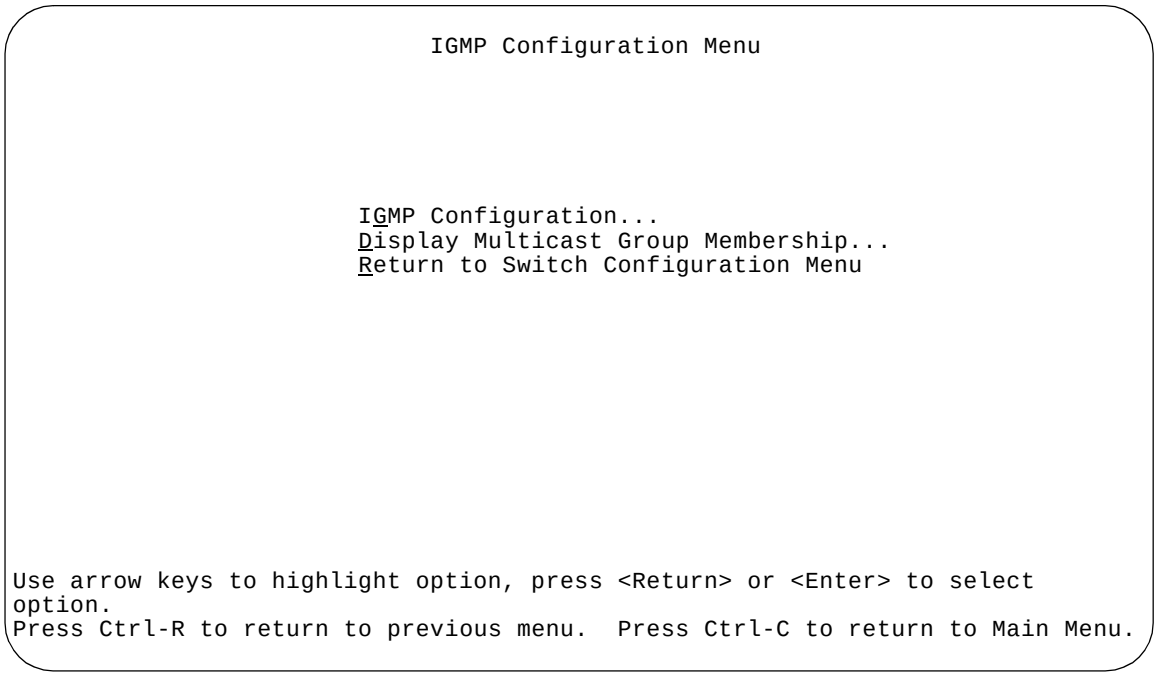

IGMP Configuration Menu
IGMP Configuration...
Display Multicast Group Membership...
Return to Switch Configuration Menu
Use arrow keys to highlight option, press <Return> or <Enter> to select option.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-23. IGMP Configuration Menu Screen

Table 3-22 describes the IGMP Configuration Menu screen options.

Table 3-22. IGMP Configuration Menu Screen Options

Option	Description
IGMP Configuration...	Displays the IGMP Configuration screen (see "IGMP Configuration" on page 3-56). This screen allows you to set up IGMP configurations.

(continued)

Table 3-22. IGMP Configuration Menu Screen Options *(continued)*

Option	Description
Display Multicast Group Membership...	Displays the Multicast Group Membership screen (see "Multicast Group Membership" on page 3-59). This screen allows you to view all IP multicast addresses that are active in the current LAN.
Return to Switch Configuration Menu	Exits the IGMP Configuration Menu screen and displays the Switch Configuration Menu screen.

IGMP Configuration

Figure 3-24 shows an example of the IGMP Configuration screen in a stacked configuration. When installed as a standalone switch, the screen does not display the Unit # field designation.

In this example, switch ports 8 and 14 of unit 1, ports 2 and 6 of unit 2, and port 16 of unit 4 are set to receive all IP multicast-related traffic. The configured ports are VLAN port members of VLAN 5, and are called Static Router Ports.

Choose IGMP Configuration (or press g) from the IGMP Configuration Menu screen to open the IGMP Configuration screen.

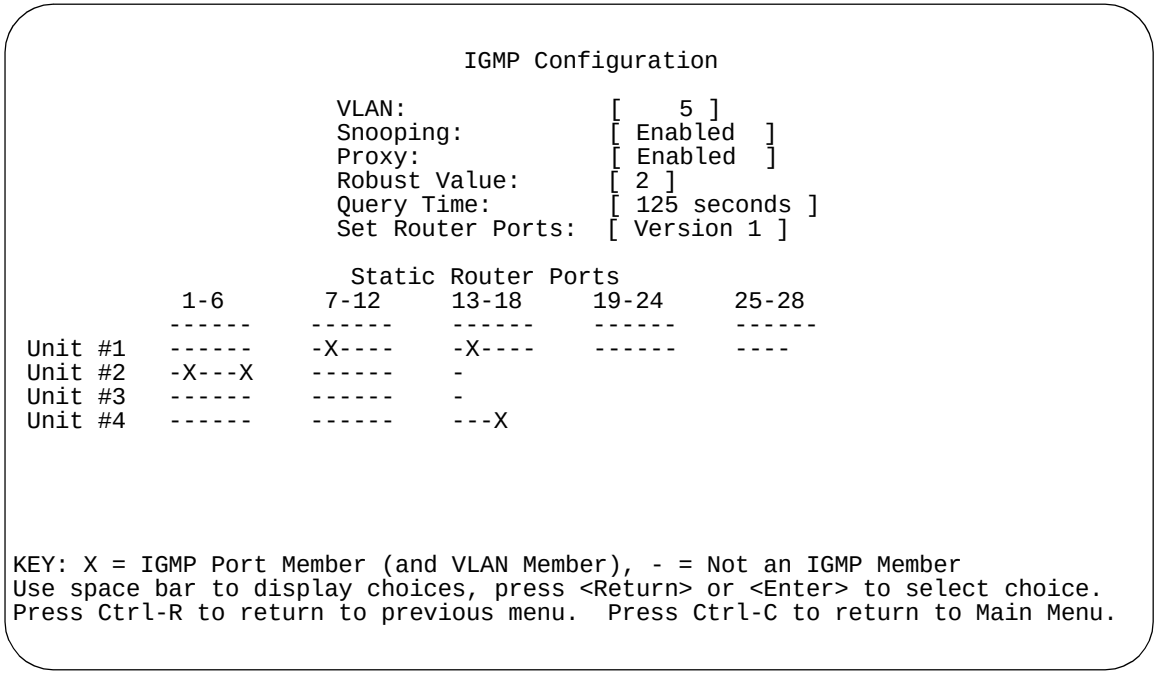

IGMP Configuration
VLAN: [5]
Snooping: [Enabled]
Proxy: [Enabled]
Robust Value: [2]
Query Time: [125 seconds]
Set Router Ports: [Version 1]
Static Router Ports
1-6 7-12 13-18 19-24 25-28
Unit #1 ------ -X---- -X---- ------ ----
Unit #2 -X---X ------ -
Unit #3 ------ ------ -
Unit #4 ------ ------ ---X
KEY: X = IGMP Port Member (and VLAN Member), - = Not an IGMP Member
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-24. IGMP Configuration Screen

Table 3-23 describes the IGMP Configuration screen fields.

Table 3-23. IGMP Configuration Screen Fields

Field	Description
VLAN	Allows you to set up or view IGMP configurations on specified VLANs. You can use the space bar to toggle to any *existing* IGMP configurations (the maximum number of VLANs that can be displayed is 64). Default 1 Range 1 to 4094

(continued)

Table 3-23. IGMP Configuration Screen Fields *(continued)*

Field	Description
Snooping	Allows you to enable or disable IGMP Snooping. This field affects all VLANs (for example, if you disable Snooping for the VLAN specified in the screen's VLAN field, Snooping is disabled for ALL VLANs). Default Value Enabled Range Enabled, Disabled
Proxy	Allows the switch to consolidate IGMP Host Membership Reports received on its downstream ports and to generate a consolidated proxy report for forwarding to its upstream neighbor. This field affects all VLANs (for example, if you disable Proxy for the VLAN specified in the screen's VLAN field, Proxy is disabled for ALL VLANs). You cannot set the Proxy field value to Disabled unless the Snooping field value is Enabled. Default Value Enabled Range Enabled, Disabled
Robust Value	Allows you to set the switch to offset expected packet loss on a subnet. If packet losses on a subnet are unacceptably high, the Robust Value field can be increased to a higher value. This field affects only the VLAN specified in the screen's VLAN field (for example, if you change the robust value on the VLAN specified in the screen's VLAN field, other VLANs are not affected). Default Value 2 Range 1 to 64
Query Time	Allows you to control the number of IGMP messages allowed on the subnet by varying the *Query Interval* (the Query Interval is the interval between general queries sent by the IP multicast router). This field affects only the VLAN specified in the screen's VLAN field (for example, if you change the Query Time value field on the VLAN specified in the screen's VLAN field, other VLANs are not affected). Default Value 125 seconds Range 1 to 512 seconds

(continued)

Table 3-23. IGMP Configuration Screen Fields *(continued)*

Field	Description
Set Router Ports	Selects the IGMP version according to the IGMPv1 (Version 1) or IGMPv2 (Version 2) standard (see RFC 2236). Use this field in conjunction with the Static Router Ports field (see next field description) to select the IGMP version to set. You can also use this field to view which static router ports are set to Version 1 or to Version 2. Use the space bar to toggle between the two versions and view the static router ports settings. This field affects all VLANs (for example, if you change the value of the Set Router Ports field on the VLAN specified in the screen's VLAN field, ALL VLANs are affected). Default Value Version 1 Range Version 1, Version 2
Static Router Ports	Allows you to assign switch ports to receive all IP multicast-related traffic. When the unit is part of a stack configuration, the screen displays the unit numbers of the switches configured in the stack, along with the corresponding ports. The configured ports do not filter any IP multicast traffic. The Static Router Ports fields are displayed in six-port groups (for example, 1-6, 7-12, 13-18). The number of ports displayed depends on the switch model or type of optional MDA that is installed in the Uplink Module slot. This field affects all VLANs (for example, if you assign a port as a static router port in this screen, the port becomes a static router port for the VLAN specified in the screen's VLAN field, and also for any other VLAN where this port is a member). Default Value - Range -, X

Multicast Group Membership

The Multicast Group Membership screen allows you to view configured IP multicast group addresses for specific VLANs. The screen displays the IP multicast group addresses associated with ports that are configured within a standalone switch or a stack of switches.

The displayed addresses are dynamic and can change as clients join, or leave, the various IP multicast groups. You can view changes by refreshing the screen (press [Ctrl]-P to refresh the screen).

Choose Display Multicast Group Membership (or press d) from the IGMP Configuration Menu screen to open the Multicast Group Membership screen.

```
                    Multicast Group Membership

                       VLAN: [    1 ]
 Multicast Group Address           Port
-------------------------        ----------------
 227.37.32.6                      Unit: 1 Port: 1
 227.37.32.5                      Unit: 1 Port: 1
 227.37.32.4                      Unit: 1 Port: 1
 227.37.32.3                      Unit: 1 Port: 1
 227.37.32.2                      Unit: 1 Port: 1
 227.37.32.1                      Unit: 1 Port: 1









Press Ctrl-P to see previous display.  Press Ctrl-N to see more addresses.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-25. Multicast Group Membership Screen

Table 3-24 describes the Multicast Group Membership screen options.

Table 3-24. Multicast Group Membership Screen Options

Option	Description
VLAN	Allows you to view Multicast group addresses on specified VLANs. You can use the space bar to view group addresses for any *existing* IGMP configurations (the maximum number of VLANs that can be displayed is 64).
Multicast Group Address	Displays all the IP multicast group addresses that are currently active on the associated port.
Port	Displays the port numbers that are associated with the IP multicast group addresses displayed in the IP multicast group address field.

Port Statistics

The Port Statistics screen (Figure 3-26) allows you to view detailed information about any switch port in a stacked or standalone configuration. The screen is divided into two sections (Received and Transmitted) so that you can compare and evaluate throughput or other port parameters. All screen data is updated approximately every 2 seconds.

You can use the Port Statistics screen to clear (reset to zero) port counters for a specific port. Alternatively, you can use the Clear All Port Statistics option to clear port counters for all ports (see "Switch Configuration Menu" on page 3-17).

Choose Display Port Statistics (or press d) from the Switch Configuration Menu screen to open the Port Statistics screen.

```
                          Port Statistics
                    Unit: [ 1 ]  Port: [  1  ]
            Received                          Transmitted
-------------------------------------    -------------------------------------
Packets:                             0    Packets:                             0
Multicasts:                          0    Multicasts:                          0
Broadcasts:                          0    Broadcasts:                          0
Total Octets:                        0    Total Octets:                        0
Lost Packets:                        0    Lost Packets:                        0
Packets 64 bytes:                    0    Packets 64 bytes:                    0
       65-127 bytes                  0           65-127 bytes                  0
       128-255 bytes                 0           128-255 bytes                 0
       256-511 bytes                 0           256-511 bytes                 0
       512-1023 bytes                0           512-1023 bytes                0
       1024-1518 bytes               0           1024-1518 bytes               0
FCS Errors:                          0    Collisions:                          0
Undersized Packets:                  0    Single Collisions:                   0
Oversized Packets:                   0    Multiple Collisions:                 0
Filtered Packets:                    0    Excessive Collisions:                0
Flooded Packets:                     0    Deferred Packets:                    0
Frame Errors:                        0    Late Collisions:                     0

Use space bar to display choices or enter text.  Press Ctrl-Z to zero counters.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-26. Port Statistics Screen

Table 3-25 describes the Port Statistics screen fields.

Note: In a stacked configuration, the Port Statistics screen appears in a slightly different format when the port selected in the Unit/Port field is configured with a gigabit MDA.

Table 3-25. Port Statistics Screen Fields

Field	Description
Unit	Only appears if the switch is participating in a stack configuration. The field allows you to select the number of the unit you want to view or configure. To view or configure another unit, type its unit number and press [Enter], or press the spacebar on your keyboard to toggle the unit numbers.
Port	Allows you to select the number of the port you want to view or reset to zero. To view another port, type its port number and press [Enter], or press the spacebar on your keyboard to toggle the port numbers.
Packets	Received column: Indicates the total number of packets received on this port, including bad packets, broadcast packets, and multicast packets. Transmitted column: Indicates the total number of packets transmitted successfully on this port, including broadcast packets and multicast packets.
Multicasts	Received column: Indicates the total number of good multicast packets received on this port, excluding broadcast packets. Transmitted column: Indicates the total number of multicast packets transmitted successfully on this port, excluding broadcast packets.
Broadcasts	Received column: Indicates the total number of good broadcast packets received on this port. Transmitted column: Indicates the total number of broadcast packets transmitted successfully on this port.
Total Octets	Received column: Indicates the total number of octets of data (including data in bad packets) received on this port, excluding framing bits but including FCS octets. Transmitted column: Indicates the total number of octets of data transmitted successfully on this port, including FCS octets.
Lost Packets	Received column: Indicates the total number of packets lost (discarded) when the capacity of the port receive buffer was exceeded. Transmitted column: Indicates the total number of packets lost (discarded) when the capacity of the port transmit buffer was exceeded.

(continued)

Table 3-25. Port Statistics Screen Fields *(continued)*

Field	Description
Packets 64 bytes	Received column: Indicates the total number of 64-byte packets received on this port.
	Transmitted column: Indicates the total number of 64-byte packets transmitted successfully on this port.
65-127 bytes	Received column: Indicates the total number of 65-byte to 127-byte packets received on this port.
	Transmitted column: Indicates the total number of 65-byte to 127-byte packets transmitted successfully on this port.
128-255 bytes	Received column: Indicates the total number of 128-byte to 255-byte packets received on this port.
	Transmitted column: Indicates the total number of 128-byte to 255-byte packets transmitted successfully on this port.
256-511 bytes	Received column: Indicates the total number of 256-byte to 511-byte packets received on this port.
	Transmitted column: Indicates the total number of 256-byte to 511-byte packets transmitted successfully on this port.
512-1023 bytes	Received column: Indicates the total number of 512-byte to 1023-byte packets received on this port.
	Transmitted column: Indicates the total number of 512-byte to 1023-byte packets transmitted successfully on this port.
1024-1518 bytes	Received column: Indicates the total number of 1024-byte to 1518-byte packets received on this port.
	Transmitted column: Indicates the total number of 1024-byte to 1518-byte packets transmitted successfully on this port.
FCS Errors	Indicates the total number of valid-size packets that were received with proper framing but discarded because of cyclic redundancy check (CRC) errors.
Undersized Packets	Indicates the total number of packets received on this port with fewer than 64 bytes and with proper CRC and framing (also known as short frames or runts).
Oversized Packets	Indicates the total number of packets received on this port with more than 1518 bytes and with proper CRC and framing (also known as oversized frames).
Filtered Packets	Indicates the number of packets filtered (not forwarded) by this port.
Flooded Packets	Indicates the total number of packets flooded (forwarded) through this port because the destination address was not in the address database.
Frame Errors	Indicates the total number of valid-size packets that were received but discarded because of CRC errors and improper framing.

(continued)

Table 3-25. Port Statistics Screen Fields *(continued)*

Field	Description
Collisions	Indicates the total number of collisions detected on this port.
Single Collisions	Indicates the total number of packets that were transmitted successfully on this port after a single collision.
Multiple Collisions	Indicates the total number of packets that were transmitted successfully on this port after more than one collision.
Excessive Collisions	Indicates the total number of packets lost on this port due to excessive collisions.
Deferred Packets	Indicates the total number of frames that were delayed on the first transmission attempt, but never incurred a collision.
Late Collisions	Indicates the total number of packet collisions that occurred after a total length of time that exceeded 512 bit-times of packet transmission.
The following field values appear only when the port selected in the Unit/Port field is configured with a gigabit MDA.	
Pause Frames	Transmitted column: Indicates the total number of pause frames transmitted on this port. Pause frames cause the transmitting port to temporarily suspend the transmission of packets when the receiving port's frame buffer is full (gigabit ports only). Received column: Indicates the total number of pause frames received on this port. Pause frames cause the transmitting port to temporarily suspend the transmission of packets when the receiving port's frame buffer is full (gigabit ports only).

Console/Comm Port Configuration

The Console/Comm Port Configuration screen (Figure 3-27) allows you to configure and modify the console/comm port parameters and security features of a standalone switch or any participating switch in a stack configuration.

Choose Console/Comm Port Configuration (or press o) from the main menu to open the Console/Comm Port Configuration screen.

```
                    Console/Comm Port Configuration

        Comm Port Data Bits:                8 Data Bits
        Comm Port Parity:                   No Parity
        Comm Port Stop Bits:                1 Stop Bit
        Console Port Speed:                 [ 9600 Baud  ]

        Console Switch Password Type:       [ None                ]
        Console Stack Password Type:        [ None                ]
        TELNET Switch Password Type:        [ None                ]
        TELNET Stack Password Type:         [ None                ]

        Console Read-Only Switch Password:  [ user ]
        Console Read-Write Switch Password: [ secure ]
        Console Read-Only Stack Password:   [ user ]
        Console Read-Write Stack Password:  [ secure ]

        Primary RADIUS Server:              [ 0.0.0.0 ]
        Secondary RADIUS Server:            [ 0.0.0.0 ]
        RADIUS UDP Port:                    [ 1645 ]
        RADIUS Shared Secret:               [  ]

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-27. Console/Comm Port Configuration Screen

Table 3-26 describes the Console/Comm Port Configuration screen fields.

Table 3-26. Console/Comm Port Configuration Screen Fields

Field	Description
Comm Port Data Bits	A read-only field that indicates the current console/comm port data bit setting.
Comm Port Parity	A read-only field that indicates the current console/comm port parity setting.

(continued)

Table 3-26. Console/Comm Port Configuration Screen Fields *(continued)*

Field	Description
Comm Port Stop Bits	A read-only field that indicates the current console/comm port stop bit setting.
Console Port Speed	Allows you to set the console/comm port baud rate to match the baud rate of the console terminal. Default Value: 9600 Baud Range: 2400 Baud, 4800 Baud, 9600 Baud, 19200 Baud, 38400 Baud

Caution: If you choose a baud rate that does not match your console terminal baud rate, you will lose communication with the configuration interface when you press [Enter]. If communication is lost, set your console terminal to match the new service port setting.

Achtung: Bei Auswahl einer Baudrate, die nicht mit der Baudrate des Konsolenterminals übereinstimmt, geht die Kommunikation mit der Konsolenschnittstelle verloren, wenn Sie die Eingabetaste drücken. Stellen Sie in diesem Fall das Konsolenterminal so ein, daß es mit der neuen Einstellung der Service-Schnittstelle übereinstimmt.

Attention: Si vous sélectionnez un débit différent de celui de votre terminal, vous perdrez le contact avec l'interface de votre console dès que vous appuierez sur [Entrée]. Pour restaurer la communication, alignez le débit de votre terminal sur le nouveau débit de votre port de service.

Precaución: Si selecciona una velocidad de transmisión que no coincide con la velocidad de transmisión del terminal de la consola, perderá la comunicación con el interfaz de la consola al pulsar [Intro]. Si se pierde la comunicación, ajuste el terminal de la consola para que coincida con el nuevo valor del puerto de servicio.

Attenzione: Nel caso in cui si scelga una velocità di trasmissione non corrispondente a quella del terminale della console, la comunicazione con l'interfaccia della console cadrà premendo il tasto [Invio]. Se la comunicazione cade, impostare il terminale della console in modo tale che corrisponda alla nuova impostazione della porta di servizio.

(continued)

Table 3-26. Console/Comm Port Configuration Screen Fields *(continued)*

Field	Description
	 注意: コンソール・ターミナルのボー・レートに合っていな ボー・レートを選択すると、[Enter]を押したときに、 コンソール・インタフェイスとの通信が途切れてしまいま この場合には、新しいサービス・ポート設定に合うように コンソール・ターミナルを設定してください。
Console Switch Password Type	Enables password protection for accessing the console interface (CI) of a *standalone switch* through a console terminal. If you set this field to Required, you can use the Logout option to restrict access to the CI. Thereafter, you will need to specify the correct password at the console-terminal prompt. See Console Read-Only Switch Password and Console Read-Write Switch Password for more information. Default Value None Range None, Local Password, RADIUS Authentication
Console Stack Password Type	Enables password protection for accessing the console interface (CI) of *any participating switch in a stack configuration*, through a console terminal. If you set this field to Required, you can use the Logout option to restrict access to the CI of any stack unit. Thereafter, you will need to specify the correct password at the console-terminal prompt when accessing the stack. See Console Read-Only Stack Password and Console Read-Write Stack Password for more information. Default Value None Range None, Local Password, RADIUS Authentication
TELNET Switch Password Type	Enables password protection for accessing the console interface (CI) of a *standalone switch* through a TELNET session. If you set this field to Required, you can use the Logout option to restrict access to the CI. Thereafter, you will need to specify the correct password at the console-terminal prompt. See Console Read-Only Switch Password and Console Read-Write Switch Password for more information. Default Value None Range None, Local Password, RADIUS Authentication

(continued)

Table 3-26. Console/Comm Port Configuration Screen Fields *(continued)*

Field	Description
TELNET Stack Password Type	Enables password protection for accessing the console interface (CI) of *any participating switch in a stack configuration*, through a TELNET session. If you set this field to Required, you can use the Logout option to restrict access to the CI of any stack unit. Thereafter, you will need to specify the correct password at the console-terminal prompt when accessing the stack. See Console Read-Only Stack Password and Console Read-Write Stack Password for more information. Default Value None Range None, Local Password, RADIUS Authentication
Console Read-Only Switch Password	When the Console Switch Password field is set to Local Password (for TELNET, for Console, or for Both), this field allows read-only password access to the CI of a *standalone switch*. Users can access the CI using the correct password (see default), but cannot change parameters or use the Reset option or Reset to Default option. Default Value user Range An ASCII string of up to 15 printable characters
Console Read-Write Switch Password	When the Console Switch Password field is set to Local Password (for TELNET, for Console, or for Both), this field allows read-write password access to the CI of a *standalone switch*. Users can log in to the CI using the correct password (see default), and can change any parameter, except the stack passwords. You can change the default passwords for read-only access and read-write access to a private password. Default Value: secure Range: Any ASCII string of up to 15 printable characters

Caution: If you change the system-supplied default passwords, be sure to write the new passwords down and keep them in a safe place. If you forget the new passwords, you cannot access the console interface. In that case, contact Nortel Networks for help.

Achtung: Wenn Sie die für das System standardmäßig eingestellten Paßwörter ändern, notieren Sie sich die neuen Paßwörter, und bewahren Sie sie an einem sicheren Ort auf. Falls Sie die neuen Paßwörter vergessen, können Sie nicht mehr auf die Konsolenschnittstelle zugreifen. Wenden Sie sich in diesem Fall an Nortel Networks, um Unterstützung zu erhalten.

(continued)

Table 3-26. Console/Comm Port Configuration Screen Fields *(continued)*

Field	Description
	Attention: Si vous changez les mots de passe par défaut du système, assurez-vous de bien noter vos nouveaux mots de passe et de les conserver dans un endroit sûr. Si vous perdez vos nouveaux mots de passe, vous ne pourrez plus accéder à votre interface. Le cas échéant, veuillez contacter Nortel Networks.
	Precaución: Si modifica las contraseñas predeterminadas asignadas por el sistema, asegúrese de anotar las nuevas contraseñas y guárdelas en un lugar seguro. Si olvida las nuevas contraseñas, no podrá acceder al interfaz de la consola. En ese caso, póngase en contacto con Nortel Networks para obtener ayuda al respecto.
	Attenzione: In caso di modifica delle password predefinite nel sistema, assicurarsi di annotare le nuove password e di conservarle in un luogo sicuro. Nel caso in cui le nuove password vengano dimenticate, non sarà possibile accedere all'interfaccia della console. In tal caso, contattare la Nortel Networks per avere assistenza.
	注意: システム装備したデフォルトのパスワードを変更する場合、必ず新しいパスワードを書き留めて安全な場所に保管してください。新しいパスワードを忘れてしまうと、コンソール・インタフェイスにアクセスできません。この場合は、Bay Networksまでご連絡ください。
Console Read-Only Stack Password	When the Console Switch Password field is set to Local Password (for TELNET, for Console, or for Both), this field allows read-only password access to the CI of *any participating switch in a stack configuration*. Users can access the CI using the correct password (see default), but cannot change any parameters or use the Reset option or Reset to Default option. Default Value user Range An ASCII string of up to 15 printable characters

(continued)

Table 3-26. Console/Comm Port Configuration Screen Fields *(continued)*

Field	Description
Console Read-Write Stack Password	When the Console Switch Password field is set to Local Password (for TELNET, for Console, or for Both), this field allows read-write password access to the CI of *any participating switch in a stack configuration*. Users can log in to the CI using the correct password (see default), and can change any parameter, except the switch password. You can change the default passwords for read-only access and read-write access to a private password. Default Value: secure Range: Any ASCII string of up to 15 printable characters

Caution: If you change the system-supplied default passwords, be sure to write the new passwords down and keep them in a safe place. If you forget the new passwords, you cannot access the console interface. In that case, contact Nortel Networks for help.

Achtung: Wenn Sie die für das System standardmäßig eingestellten Paßwörter ändern, notieren Sie sich die neuen Paßwörter, und bewahren Sie sie an einem sicheren Ort auf. Falls Sie die neuen Paßwörter vergessen, können Sie nicht mehr auf die Konsolenschnittstelle zugreifen. Wenden Sie sich in diesem Fall an Nortel Networks, um Unterstützung zu erhalten.

Attention: Si vous changez les mots de passe par défaut du système, assurez-vous de bien noter vos nouveaux mots de passe et de les conserver dans un endroit sûr. Si vous perdez vos nouveaux mots de passe, vous ne pourrez plus accéder à votre interface. Le cas échéant, veuillez contacter Nortel Networks.

Precaución: Si modifica las contraseñas predeterminadas asignadas por el sistema, asegúrese de anotar las nuevas contraseñas y guárdelas en un lugar seguro. Si olvida las nuevas contraseñas, no podrá acceder al interfaz de la consola. En ese caso, póngase en contacto con Nortel Networks para obtener ayuda al respecto.

(continued)

Table 3-26. Console/Comm Port Configuration Screen Fields *(continued)*

Field	Description
	Attenzione: In caso di modifica delle password predefinite nel sistema, assicurarsi di annotare le nuove password e di conservarle in un luogo sicuro. Nel caso in cui le nuove password vengano dimenticate, non sarà possibile accedere all'interfaccia della console. In tal caso, contattare la Nortel Networks per avere assistenza.
	注意: システム装備したデフォルトのパスワードを変更する場合、必ず新しいパスワードを書き留めて安全な場所に保管してください。新しいパスワードを忘れてしまうと、コンソール・インタフェイスにアクセスできません。この場合は、Bay Networksまでご連絡ください。
Primary RADIUS Server	The IP address of the Primary RADIUS server. Default: 0.0.0.0 (no IP address assigned) Range: Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
Secondary RADIUS Server	The IP address of the Secondary RADIUS server. Default: 0.0.0.0 (no IP address assigned) Range: Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
RADIUS UDP Port	The user datagram protocol (UDP) port for the RADIUS server. Default: 1645 Range: 0 to 65536
RADIUS Shared Secret	Your special switch security code that provides authentication to the RADIUS server. Default: Null string (which will not authenticate) Range: Any contiguous ASCII string that contains at least 1 printable character, up to a maximum of 35.

Renumber Stack Units

The Renumber Stack Units screen (Figure 3-28) allows you to renumber the units configured in the stack.

When selected, this option identifies the unit number of each unit in the stack configuration by lighting the corresponding number of port LEDs on each unit for approximately 10 seconds. For example, unit 3 will display three LEDs.

Note: This menu option and screen only appear when the switch is participating in a stack configuration.

Choose Renumber Stack Units (or press n) from the main menu to open the Renumber Stack Units screen.

```
                          Renumber Stack Units

  Current Unit Number              MAC Address           New Unit Number
  -------------------    ------------------------------    ---------------
        [  1  ]                 00-60-fd-77-a6-0c              [  1  ]
        [  2  ]                 00-60-fd-77-a5-f0              [  2  ]
        [  3  ]                 00-60-fd-77-a4-4c              [  3  ]
        [  4  ]                 00-60-fd-77-ab-84              [  4  ]




Renumbering stack units will cause an automatic Reset to Current Settings to
occur across the entire stack.  The current configuration will be adapted to
the new numbering scheme. Check the stack configuration after the reset to
confirm the desired configuration is set.

Are you sure you want to renumber switches with the new settings?   [ No  ]



Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-28. Renumber Stack Units Screen

Table 3-27 describes the Renumber Stack Units screen options:

Table 3-27. Renumber Stack Units Screen Options

Option	Description
Current Unit Number	Read-only fields listing the current unit number of each of the configured stack units. The entries in this column are displayed in order of their current physical cabling with respect to the base unit, and can show nonconsecutive unit numbering if one or more units were previously moved or modified. The entries can also include unit numbers of units that are no longer participating in the stack (not currently active).
MAC Address	Read-only field listing the MAC address of the corresponding unit listed in the Current Unit Number field.
New Unit Number	User-settable field showing the current unit number of each unit in the stack. You can change any of the fields, as required. You can also delete entries by typing zero (0) or using the space bar to clear the field when the unit is not in the stack. Default Value Current stack order Range 1 to 8
Renumber units with new setting?	Specifies whether to start the renumbering process (default is No). Use the spacebar to toggle the selection to Yes. Renumbering resets the switch with the current configuration values. When you select this option, the switch resets, runs a self-test, then displays the Nortel Networks logo screen. After you press [Ctrl]-Y at the screen prompt, the console screen temporarily displays the (standalone) BayStack 410-24T Main Menu. Then, within 20 seconds, the console screen refreshes and displays the main menu screen for the stack configuration. The Unit LEDs display the new numbering order. Default Value No Range No, Yes

Hardware Unit Information

The Hardware Unit Information screen (Figure 3-29) lists the switch models, including any installed MDA and Cascade modules, that are configured in your standalone or stack configuration.

Choose Display Hardware Units (or press h) from the main menu to open the Hardware Unit Information screen.

```
                        Hardware Unit Information



           Switch Model         MDA Model   Cascade MDA
           ----------------     ---------   -----------
 Unit #1   BayStack 450-24T     None        400-ST1
 Unit #2   BayStack 450-12T     450-1SX     400-ST1
 Unit #3   BayStack 450-24T     400-4FX     400-ST1
 Unit #4   BayStack 410-24T     400-4FX     400-ST1
 Unit #5   BayStack 450-24T     None        400-ST1
 Unit #6   BayStack 450-12T     450-1SX     400-ST1
 Unit #7   BayStack 450-24T     400-4FX     400-ST1
 Unit #8   BayStack 410-24T     None        400-ST1









Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-29. Hardware Unit Information Screen

Spanning Tree Configuration

The Spanning Tree Configuration Menu screen (Figure 3-30) allows you to view spanning tree parameters and configure individual switch ports to participate in the spanning tree algorithm (STA). To modify any of the spanning tree parameters, see your SNMP documentation.

Choose Spanning Tree Configuration (or press p) from the main menu to open the Spanning Tree Configuration Menu screen.

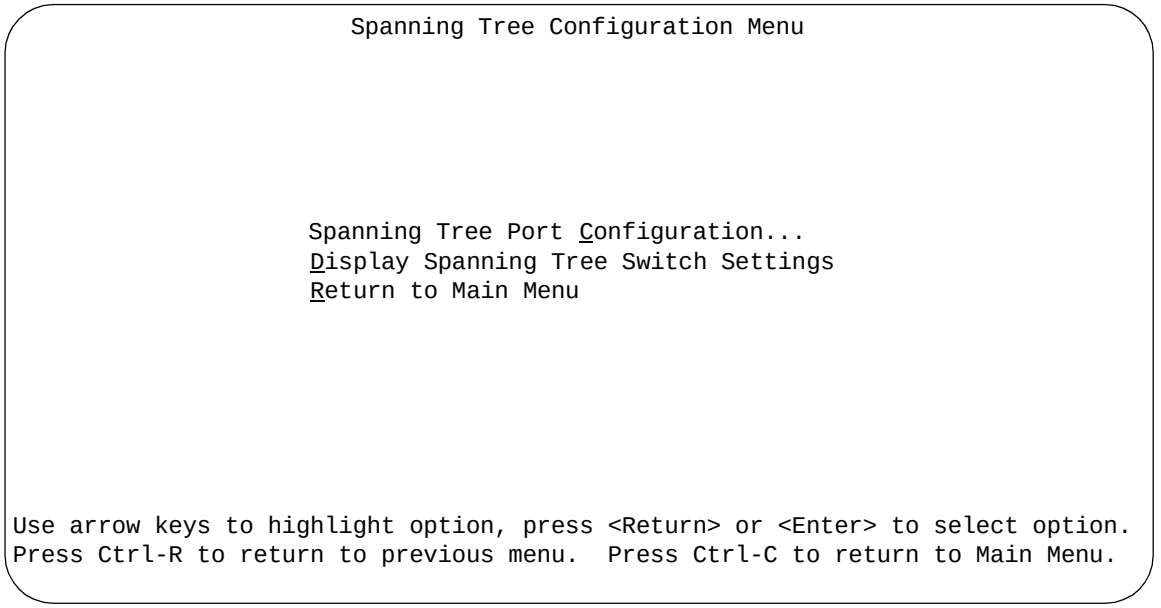

Spanning Tree Configuration Menu
Spanning Tree Port Configuration...
Display Spanning Tree Switch Settings
Return to Main Menu
Use arrow keys to highlight option, press <Return> or <Enter> to select option.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.

Figure 3-30. Spanning Tree Configuration Menu Screen

Table 3-28 describes the Spanning Tree Configuration Menu screen options:

Table 3-28. Spanning Tree Configuration Menu Screen Options

Option	Description
Spanning Tree Port Configuration...	Displays the Spanning Tree Port Configuration screen (see "Spanning Tree Port Configuration" on page 3-76).
Display Spanning Tree Switch Settings	Displays the Spanning Tree Switch Settings screen (see "Display Spanning Tree Switch Settings" on page 3-79).
Return to Main Menu	Exits the Spanning Tree Configuration Menu and displays the main menu.

Spanning Tree Port Configuration

The Spanning Tree Port Configuration screen allows you to configure individual switch ports or all switch ports for participation in the spanning tree.

Note: If spanning tree participation of any trunk member is changed (enabled or disabled), the spanning tree participation of all members of that trunk is changed similarly.

Figure 3-31 and Figure 3-32 show sample port configurations for the two Spanning Tree Port Configuration screens.

Choose Spanning Tree Port Configuration (or press c) from the Spanning Tree Configuration Menu to open the Spanning Tree Port Configuration screen.

```
                    Spanning Tree Port Configuration

                                  Unit:  [ 1 ]
Port   Trunk      Participation       Priority    Path Cost       State
----   -----   -------------------    --------    ---------     ----------
  1            [ Normal Learning ]     128           100        Forwarding
  2            [ Normal Learning ]     128           100        Forwarding
  3            [ Normal Learning ]     128           100        Forwarding
  4            [ Normal Learning ]     128           100        Forwarding
  5            [ Normal Learning ]     128           100        Forwarding
  6       1    [ Normal Learning ]     128           100        Forwarding
  7       1    [ Normal Learning ]     128           100        Forwarding
  8            [ Normal Learning ]     128           100        Forwarding
  9       1    [ Normal Learning ]     128           100        Forwarding
 10            [ Normal Learning ]     128           100        Forwarding
 11            [ Normal Learning ]     128           100        Forwarding
 12            [ Normal Learning ]     128           100        Forwarding
 13       3    [ Normal Learning ]     128           100        Forwarding
 14       3    [ Normal Learning ]     128           100        Forwarding
                                                                      More...


Press Ctrl-N to display choices for additional ports..
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-31. Spanning Tree Port Configuration Screen (1 of 2)

```
                    Spanning Tree Port Configuration

                                  Unit:  [ 1 ]
Port   Trunk      Participation       Priority    Path Cost       State
----   -----   -------------------    --------    ---------     ----------
 15            [ Normal Learning ]     128            5        Forwarding
 16            [ Normal Learning ]     128            5        Forwarding
 17       1    [ Normal Learning ]     128          100        Forwarding
 18            [ Normal Learning ]     128          100        Forwarding
 19       4    [ Normal Learning ]     128          100        Forwarding
 20       4    [ Normal Learning ]     128          100        Forwarding
 21            [ Normal Learning ]     128          100        Forwarding
 22       5    [ Normal Learning ]     128          100        Forwarding
 23       5    [ Normal Learning ]     128          100        Forwarding
 24            [ Normal Learning ]     128          100        Forwarding
 25       2    [ Normal Learning ]     128          10         Forwarding
 26       2    [ Normal Learning ]     128          10         Forwarding
 27            [ Normal Learning ]     128          10         Forwarding
 28            [ Normal Learning ]     128          10         Forwarding
 Switch        [ Normal Learning ]
 Stack         [ Normal Learning ]


Press Ctrl-P to display choices for ports 1-14.
Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-32. Spanning Tree Port Configuration Screen (2 of 2)

Table 3-29 describes the Spanning Tree Port Configuration screen fields.

Table 3-29. Spanning Tree Port Configuration Screen Fields

Field	Description
Unit	This field only appears if the switch is participating in a stack configuration. The field allows you to select the number of the unit you want to view. To view another unit, type its unit number and press [Enter], or press the spacebar on your keyboard to toggle the unit numbers.
Port	Indicates the switch port numbers that correspond to the field values in that row of the screen (for example, the field values in row 2 apply to switch port 2). Note that the values in the *Switch* row affect all switch ports and, when the switch is part of a stack, the values in the *Stack* row affect all ports in the entire stack.
Trunk	The read-only data displayed in this column indicates the trunks that correspond to the switch ports specified in the Trunk Members fields of the Trunk Configuration screen (see "MultiLink Trunk Configuration" on page 3-41).

(continued)

Table 3-29. Spanning Tree Port Configuration Screen Fields *(continued)*

Field	Description
Participation	Allows you to configure any (or all) of the switch ports for Spanning tree participation. When an individual port is a trunk member (see Trunk field), changing this setting for one of the trunk members changes the setting for all members of that trunk. You should consider how this can change your network topology before you change this setting (see “MultiLink Trunking Configuration Rules” on page 1-69). The Fast Learning parameter is the same as Normal Learning, except that the state transition timer is shortened to two seconds. Default Value: Normal Learning Range: Normal Learning, Fast Learning, Disabled
Priority	This read-only field is a bridge spanning tree parameter that prioritizes the port’s lowest path cost to the root. When one or more ports have the same path cost, the STA selects the path with the highest priority (lowest numerical value). See also Path Cost. Default Value: 128 Range: 0 to 255
Path Cost	This read-only field is a bridge spanning tree parameter that determines the lowest path cost to the root. Default Value: 10 or 100 Path Cost = 1000/LAN speed (in Mb/s) The higher the LAN speed, the lower the path cost. See also Priority. Range: 1 to 65535
State	This read-only field indicates the current port state within the spanning tree network. Each port can transition to various states, as determined by the Participation field setting. For example, when the Participation field is set to Disabled, the port does not participate in the STA and transitions to the Forwarding state (the default). When the Participation field is set to Enabled, the port transitions from the Disabled state through the Blocking, Listening, and Learning states before entering the Forwarding state. Default Value: Topology dependent Range: Disabled, Blocking, Listening, Learning, Forwarding

Display Spanning Tree Switch Settings

The Spanning Tree Switch Settings screen (Figure 3-33) allows you to view spanning tree parameter values for the BayStack 410-24T switch.

Choose Display Spanning Tree Switch Settings (or press d) from the Spanning Tree Configuration Menu screen to open the Spanning Tree Switch Settings screen.

```
                    Spanning Tree Switch Settings



              Bridge Priority:          8000
              Designated Root:          80000060FD77A62B
              Root Port:                Unit: 0  Port: 0
              Root Path Cost:           0
              Hello Time:               2 seconds
              Maximum Age Time:         20 seconds
              Forward Delay:            15 seconds
              Bridge Hello Time:        2 seconds
              Bridge Maximum Age Time:  20 seconds
              Bridge Forward Delay:     15 seconds




Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-33. Spanning Tree Switch Settings Screen

Table 3-30 describes the Spanning Tree Switch Settings parameters.

Table 3-30. Spanning Tree Switch Settings Parameters

Parameter	Description
Bridge Priority	Indicates the management-assigned priority value of the bridge ID in hexadecimal notation, which is the most significant byte of the bridge ID. The STA uses this parameter to determine the root bridge (or designated bridge). For example, the bridge with the lowest bridge ID becomes the root bridge, with Bridge Priority values compared first, followed by the hardware addresses.
	Default Value 8000
	Range 0 to 65535
Designated Root	Indicates the bridge ID of the root bridge, as determined by the STA.
	Default Value 8000 (bridge_id)
	Range 0 to 65535
Root Port	Indicates the switch port number that offers the lowest path cost to the root bridge.
	Default Value 0
	Range 0 to 16
Root Path Cost	Indicates the path cost from this switch port to the root bridge.
	Default Value 0
	Range Not applicable
Hello Time	Indicates the Actual Hello Interval, the amount of time between transmissions of configuration Bridge Protocol Data Units (BPDUs) that the root bridge is currently using.
	Note that all bridges participating in the spanning tree network use the root bridge's Hello Interval parameter value. See also Bridge Hello Time.
	Default Value 2 seconds
	Range 1 to 10 seconds
Maximum Age Time	Indicates the Maximum Age Time parameter value that the root bridge is currently using. This value specifies the maximum age that a Hello message can attain before it is discarded.
	Note that the root bridge's Maximum Age Time parameter value becomes the actual Maximum Age Time parameter value for all bridges participating in the spanning tree network. See also Bridge Maximum Age Time.
	Default Value 20 seconds
	Range 6 to 40 seconds

(continued)

Table 3-30. Spanning Tree Switch Settings Parameters *(continued)*

Parameter	Description
Forward Delay	Indicates the Forward Delay parameter value that the root bridge is currently using. This value specifies the amount of time that the bridge ports remain in the Listening and Learning states before entering the Forwarding state. Note that the root bridge's Forward Delay parameter value becomes the actual Forward Delay parameter value for all bridges participating in the spanning tree network. See also Bridge Forward Delay. Default Value 15 seconds Range 4 to 30 seconds
Bridge Hello Time	Indicates the Hello Interval (the amount of time between transmissions of BPDUs) specified by management for this bridge. This parameter takes effect only when this bridge becomes the root bridge. Note that, although you can set the Hello Interval for a bridge using bridge management software, once the spanning tree computation process is complete, all bridges participating in the spanning tree network use the root bridge's Hello Interval parameter value. If any bridge becomes the root bridge, its Hello Interval parameter value becomes the Actual Hello Interval parameter value for all bridges participating in the spanning tree network. See also Hello Time. Default Value 2 seconds Range 1 to 10 seconds
Bridge Maximum Age Time	Specifies the maximum age (in seconds) that a Hello message can attain before it is discarded. This parameter, specified by management for this bridge, takes effect only when the bridge becomes the root bridge. Note that, if this bridge becomes the root bridge, its Maximum Age Time parameter value becomes the Actual Maximum Age Time parameter value for all bridges participating in the spanning tree network. See also Maximum Age Time. Default Value 20 seconds Range 6 to 40 seconds
Bridge Forward Delay	Indicates the Forward Delay parameter value specified by management for this bridge. This parameter takes effect only when this bridge becomes the root bridge. The Forward Delay parameter value specifies the amount of time that the bridge ports remain in the Listening and Learning states before entering the Forwarding state. Note that all bridges participating in the spanning tree network use the root bridge's Forward Delay parameter value. See also Forward Delay. Default Value 15 seconds Range 4 to 30 seconds

TELNET Configuration

The TELNET Configuration screen (Figure 3-34) allows you to communicate with the BayStack 410-24T switch from a remote console terminal. You can have up to four active TELNET sessions at one time.

Choose TELNET Configuration (or press t) from the main menu to open the TELNET Configuration screen.

```
                          TELNET Configuration

                    TELNET Access:       [ Enabled  ]
                    Login Timeout:       [ 1 minute ]
                    Login Retries:       [ 3 ]
                    Inactivity Timeout:  [ 15 minutes ]
                    Event Logging:       [ All      ]

          Allowed Source IP Address          Allowed Source Mask
          -------------------------          -------------------------
             [ 0.0.0.0 ]                        [ 0.0.0.0 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]
             [ 255.255.255.255 ]                [ 255.255.255.255 ]

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-34. TELNET Configuration Screen

Table 3-31 describes the TELNET Configuration screen fields.

Table 3-31. TELNET Configuration Screen Fields

Field	Description
TELNET Access	Allows remote access to the CI through a TELNET session. Default Value: Enabled Range: Enabled, Disabled
Login Timeout	Specifies the amount of time you have to enter the correct password at the console-terminal prompt. Default Value: 1 minute Range: 0 to 10 minutes (0 indicates “no timeout”)
Login Retries	Specifies the number of times you can enter an incorrect password at the console-terminal prompt before the session is terminated. Default Value: 3 Range: 1 to 100
Inactivity Timeout	Specifies the amount of time the session can be inactive before it is terminated. Default Value: 15 minutes Range: 0 to 60 minutes (0 indicates “no timeout”)
Event Logging	Specifies the types of events that will be displayed in the Event Log screen (see “Display Event Log” on page 3-92). Default Value: All Range: All, None, Accesses, Failures Description: *All:* Logs the following TELNET events to the Event Log screen: • TELNET connect: Indicates the IP address and access mode of a TELNET session. • TELNET disconnect: Indicates the IP address of the remote host and the access mode, due to either a logout or inactivity. • Failed TELNET connection attempts: Indicates the IP address of the remote host whose IP address is not on the list of allowed addresses, or indicates the IP address of the remote host that did not supply the correct password. *None:* Indicates that no TELNET events will be logged in the Event Log screen. *Accesses*: Logs only TELNET connect and disconnect events in the Event Log screen. *Failures:* Logs only failed TELNET connection attempts in the Event Log screen. *(continued)*

Table 3-31. TELNET Configuration Screen Fields *(continued)*

Field	Description	
Allowed Source IP Address	Specifies up to 10 user-assigned host IP addresses that are allowed TELNET access to the CI.	
	Default Value:	0.0.0.0 (no IP address assigned)
	Range:	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
Allowed Source Mask	Specifies up to 10 user-assigned allowed source address masks. The remote IP address is masked with the Allowed Source Mask and, if the resulting value equals the Allowed Source IP address, the connection is allowed. For example, a connection would be allowed with the following settings: Remote IP address = 192.0.1.5 Allowed Source IP Address = 192.0.1.0 Allowed Source Mask = 255.255.255.0	
	Default Value:	0.0.0.0 (no IP mask assigned)
	Range:	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point

Software Download

The Software Download screen (Figure 3-35) allows you to revise the BayStack 410-24T switch software image that is located in nonvolatile flash memory.

To download the BayStack 410-24T switch software image, you need a properly configured Trivial File Transfer Protocol (TFTP) server in your network, and an IP address for the switch (or stack, if configured). To learn how to configure the switch or stack IP address, see "IP Configuration" on page 3-7.

You can monitor the software download process by observing the BayStack 410-24T switch LEDs (see "LED Indications During the Download Process" on page 3-87.

Caution: Do not interrupt power to the device during the software download process. If the power is interrupted, the firmware image can become corrupted.

Achtung: Unterbrechen Sie die Stromzufuhr zum Gerät nicht, während die Software heruntergeladen wird. Bei Unterbrechung der Stromzufuhr kann das Firmware-Image beschädigt werden.

Attention: Ne pas couper l'alimentation de l'appareil pendant le chargement du logiciel. En cas d'interruption, le programme résident peut être endommagé.

Precaución: No interrumpa la alimentación del dispositivo durante el proceso de descarga del software. Si lo hace, puede alterar la imagen de la programación (firmware).

Attenzione: Non interrompere l'alimentazione elettrica al dispositivo durante il processo di scaricamento del software. In caso di interruzione, l'immagine firmware potrebbe danneggiarsi.

注意：ソフトウェアをダウンロードしているとき、ディバイスへの電源を切らないでください。電源を切ると、ファームウェアのイメージを損う恐れがあります。

Choose Software Download (or press f) from the main menu to open the Software Download screen.

```
                              Software Download


       Image Filename:                [ b4101102.img ]
       TFTP Server IP Address:        [ 192.0.1.12 ]

       Start TFTP Load of New Image:  [ Yes ]

       The Software Download process has started.  Do NOT power down the
       switch before the process has completed (approximately 10 minutes).


Enter text, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-35. Software Download Screen

Table 3-32 describes the Software Download screen fields.

Table 3-32. Software Download Screen Fields

Field	Description
Image Filename	The software image load file name.

Note: Certain software releases may require you to download two images: the *boot code image* and the *agent image*. For proper operation of the switch, the new boot code image must be downloaded *before* the agent image is downloaded.

Default Value	Zero-length string
Range	An ASCII string of up to 30 printable characters

(continued)

Table 3-32. Software Download Screen Fields *(continued)*

Field	Description	
TFTP Server IP Address	The IP address of your TFTP load host.	
	Default Value	0.0.0.0 (no IP address assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
Start TFTP Load of New Image	Specifies whether to start the download of the switch software image (default is No).	
	Use the spacebar to toggle the selection to Yes.	
	Press [Enter] to initiate the software download process.	
	Note: The software download process can take up to 60 seconds to complete (or more if the load host path is congested or there is a high volume of network traffic).	
	To ensure that the download process is not interrupted, do not power down the switch for approximately 10 minutes.	
	Default Value	No
	Range	Yes, No

LED Indications During the Download Process

The software download process automatically completes without user intervention. The process erases the contents of flash memory and replaces it with a new software image. Be careful not to interrupt the download process until after it runs to completion (the process could take up to 10 minutes for completion, depending on network conditions).

Note: If problems occur during the software download process, the Software Download screen displays error codes that define the problem. The error codes are described in Chapter 4, “Troubleshooting.”

When the download process is complete, the switch automatically resets and the new software image initiates a self-test. The BayStack 410-24T switch Self-Test screen (see Figure 2-11 on page 2-15) briefly displays the results and is followed by the Nortel Networks logo screen. Press [Ctrl]-Y from the Nortel Networks logo screen to access the BayStack 410-24T switch main menu.

During the download process, the BayStack 410-24T switch is not operational. You can monitor the progress of the download process by observing the LED indications.

Table 3-33 describes the LED indications during the software download process.

Note: The LED indications described in Table 3-33 apply to a 24-port switch model. Although a 12-port switch provides *similar* LED indications, the LED indication sequence is associated within the 12-port range.

Table 3-33. LED Indications During the Software Download Process

Phase	Description	LED Indications
1	The switch downloads the new software image.	**Link status LEDs (ports 18 to 24 only):** The LEDs begin to turn on in succession beginning with port 24, which indicates the progress of the download process. When LEDs 18 to 24 are all on, the switch has received the new software image successfully.
2	The switch erases the flash memory.	**Link status LEDs (ports 1 to 12 only):** The LEDs begin to turn on in succession beginning with port 1, which indicates that various sectors of the switch's flash memory are being erased. When LEDs 1 to 12 are all on, the switch's flash memory has been erased.
3	The switch programs the new software image into the flash memory.	**Link status LEDs (ports 1 to 8 only):** The LEDs begin to turn on in succession beginning with port 1, which indicates that the new software image is being programmed into the switch's flash memory. When LEDs 1 to 8 are all on, the new software image has been programmed successfully into the switch's flash memory.
4	The switch resets automatically.	After the reset completes, the new software image initiates the switch's self-test, which comprises various diagnostic routines and subtests. The LEDs display various patterns to indicate that the subtests are in progress. The results of the self-test are displayed briefly in the Self-Test screen, after which the CI screens appear.

Configuration File

The Configuration File Download/Upload screen (Figure 3-36) allows you to store your switch/stack configuration parameters on a TFTP server.

You can retrieve the configuration parameters of a standalone switch or an entire stack and use the retrieved parameters to automatically configure a replacement switch or stack. Certain requirements apply when automatically configuring a switch or stack using this feature (see "Requirements" on page 3-90). You must set up the file on your TFTP server and set the filename read/write permission to Enabled before you can save the configuration parameters.

Although most configuration parameters are saved to the configuration file, certain parameters are not saved (see Table 3-35 on page 3-91).

Choose Configuration File (or press g) from the main menu to open the Configuration File Download/Upload screen.

```
                    Configuration File Download/Upload




    Configuration Image Filename:                [  ]
    TFTP Server IP Address:                      [ 132.245.164.4 ]
    Copy Configuration Image to Server:          [ No  ]
    Retrieve Configuration Image from Server:    [ No  ]




Enter text, press <Return> or <Enter> when complete.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Figure 3-36. Configuration File Download/Upload Screen

Table 3-34 describes the Configuration File Download/Upload screen fields:

Table 3-34. Configuration File Download/Upload Screen Fields

Field	Description	
Configuration Image Filename	The file name you have chosen for the configuration file. Choose a meaningful file name that will allow you to identify the file for retrieval when required. The file must already exist on your TFTP server and must be read/write enabled.	
	Default Value	Zero-length string
	Range	An ASCII string of up to 30 printable characters
TFTP Server IP Address	The IP address of your TFTP load host.	
	Default Value	0.0.0.0 (no IP address assigned)
	Range	Four-octet dotted-decimal notation, where each octet is represented as a decimal value, separated by a decimal point
Copy Configuration Image to Server	Specifies whether to copy the presently configured switch/stack parameters to the specified TFTP server (default is No).	
	Use the spacebar to toggle the selection to Yes.	
	Press [Enter] to initiate the process.	
	Default Value	No
	Range	Yes, No
Retrieve Configuration Image from Server	Specifies whether to retrieve the stored switch/stack configuration parameters from the specified TFTP server (default is No). If you choose Yes, the download process begins immediately and, when completed, causes the switch/stack to reset with the new configuration parameters.	
	Use the spacebar to toggle the selection to Yes.	
	Press [Enter] to initiate the process.	
	Default Value	No
	Range	Yes, No

Requirements

- The Configuration File feature can only be used to copy *standalone switch configuration parameters to other standalone switches* or to copy *stack configuration parameters to other stack configurations*.

  For example, you cannot duplicate the configuration parameters of a unit in a *stack* configuration and use it to configure a *standalone* switch.

- A configuration file obtained from a standalone switch can only be used to configure other standalone switches that have the same firmware revision and model type as the donor standalone switch.
- A configuration file obtained from a stack unit can only be used to configure other stacks that have the same number of switches, firmware version, model types, and physical IDs as the stack the donor stack unit resides in.

  Reconfigured stacks are configured according to the unit order number of the donor unit. For example, the configuration file parameters from a donor unit with physical ID *x* are used to reconfigure the unit with physical ID *x*.
- The configuration file also duplicates any settings that exist for any MDA that is installed in the donor switch.

  If you use the configuration file to configure another switch that has the same MDA model installed, the configuration file settings will also apply to and override the existing MDA settings.

Table 3-35. Parameters Not Saved to the Configuration File

These parameters are not saved:	Used in this screen:	See page:
In-Band Stack IP Address	IP Configuration/Setup	3-7
In-Band Switch IP Address		
In-Band Subnet Mask		
Default Gateway		
Console Read-Only Switch Password	Console/Comm Port Configuration	3-65
Console Read-Write Switch Password		
Console Read-Only Stack Password		
Console Read-Write Stack Password		
Configuration Image Filename	Configuration File Download/Upload	3-89
TFTP Server IP Address		

Display Event Log

This section describes the various functions of the Event Log screen (Figure 3-37).

When the switch is part of a stack configuration, the Event Log screen displays only the data for the specific unit you are connected to through the Console/ Comm port. However, if you are connected to a stack unit through a TELNET session, the Event Log screen displays the data for the base unit of that stack configuration.

Note: This screen does not refresh dynamically to show new entries. To refresh the screen, press [Ctrl]-P.

Choose Display Event Log (or press e) from the main menu to open the Event Log screen.

```
                                Event Log


Entry Number:  4          sysUpTime:  00:14:36       Reset Count:  2
Connection logout, IP address: 38.227.40.8, access mode: no security.

Entry Number:  3          sysUpTime:  00:13:35       Reset Count:  2
Connection logout, IP address: 38.227.40.8, access mode: no security.

Entry Number:  2          sysUpTime:  00:00:53       Reset Count:  2
Successful connection from IP address: 38.227.40.8, access mode: no security.

Entry Number:  1          sysUpTime:  00:00:00       Reset Count:  1
Software downloaded to BayStack Model 410-24T HW:Revx FW:Vx.xx SW:Vx.x.x.x



Press Ctrl-P to see previous display. Press Ctrl-N to see more entries.
Press Ctrl-R to return to previous menu. Press Ctrl-C to return to Main Menu.
```

Figure 3-37. Event Log Screen

The Event Log screen provides the following information:

- **Software download:** Indicates the new software version.
- **Authentication failure:** Indicates any attempted SNMP **get** or **set** access that specified an invalid community string.
- **TELNET session status:** Indicates various TELNET events. (For details on configuring this feature, see "TELNET Configuration" on page 3-82.)
- **Operational exception:** Indicates that the microprocessor has received an exception at the specified vector number and dumps stack registers.
- **Excessive bad entries:** Displays excessive bad entries detected by firmware.
- **Write threshold:** Displays event entries that exceeded the write threshold.
- **Flash update:** Displays status of flash updates.

Excessive Bad Entries

If the firmware detects excessive bad entries in the event log's flash memory (errors exceeding 75 percent of the memory buffer), the event log is cleared (all entries are discarded) and an event entry is displayed in the Event Log screen.

Figure 3-38 shows an example of the event log entry for this type of event.

```
Entry Number:  4          sysUpTime:  00:20:53       Reset Count:  2
Excessive bad entries in log, Event Log cleared.
```

Figure 3-38. Sample Event Log Entry Showing Excessive Bad Entries

Write Threshold

To extend the lifetime of the event log's flash memory, a write threshold is set for each event entered in flash memory. The write threshold is 20 entries for each event. If any event exceeds the write threshold, an event entry is displayed in the Event Log screen.

Figure 3-39 shows an example of the event log entry for this type of event.

```
Entry Number:  3          sysUpTime: 02:29:44 Reset Count:  2
The last event exceeded the write threshold. Further write attempts
by this event are blocked. The write threshold will be cleared when
the switch is reset or when the Event Log is compressed.
```

Figure 3-39. Sample Event Log Entry Exceeding the Write Threshold

The write threshold is reset when either of the following occurs:

- The BayStack 410-24T switch is reset.
- The firmware determines that compression is required for maintenance of the event log's flash memory.

Flash Update

Figure 3-40 shows an example of the event log entry for this type of event.

```
Entry Number:  13          sysUpTime: 12:20:38 Reset Count:  2
Flash configuration update operation (write or erase) failed.
Configuration information may be lost.
```

Figure 3-40. Sample Event Log Entry Showing Flash Update Status

Reset

The Reset option (accessed from the main menu) allows you to reset a standalone switch, a specific unit in a stack configuration, or an entire stack without erasing any configured switch parameters. Resetting the switch takes approximately 5 seconds. During this time, the switch initiates a self-test that comprises various diagnostic routines and subtests. The LEDs display various patterns to indicate that the subtests are in progress. The results of the self-test are displayed briefly (5 or 10 seconds) in the Self-Test screen (Figure 3-41), which is followed by the Nortel Networks logo screen (Figure 3-42).

Note: The Self-Test screen remains displayed only if the self-test detects a fatal error.

```
BayStack 410-24T Self-Test

   CPU RAM test                    ... Pass
   ASIC addressing test            ... Pass
   ASIC buffer RAM test            ... Pass
   ASIC buffer stack init test     ... Pass
   Port internal loopback test     ... Pass
   Cascade SRAM test               ... Pass
   Fan test                        ... Pass

Self-test complete.
```

Figure 3-41. Self-Test Screen After Resetting the Switch

Note: The Self-Test screen for a switch that is participating in a stack configuration includes an additional test: `Cascade SRAM test.`

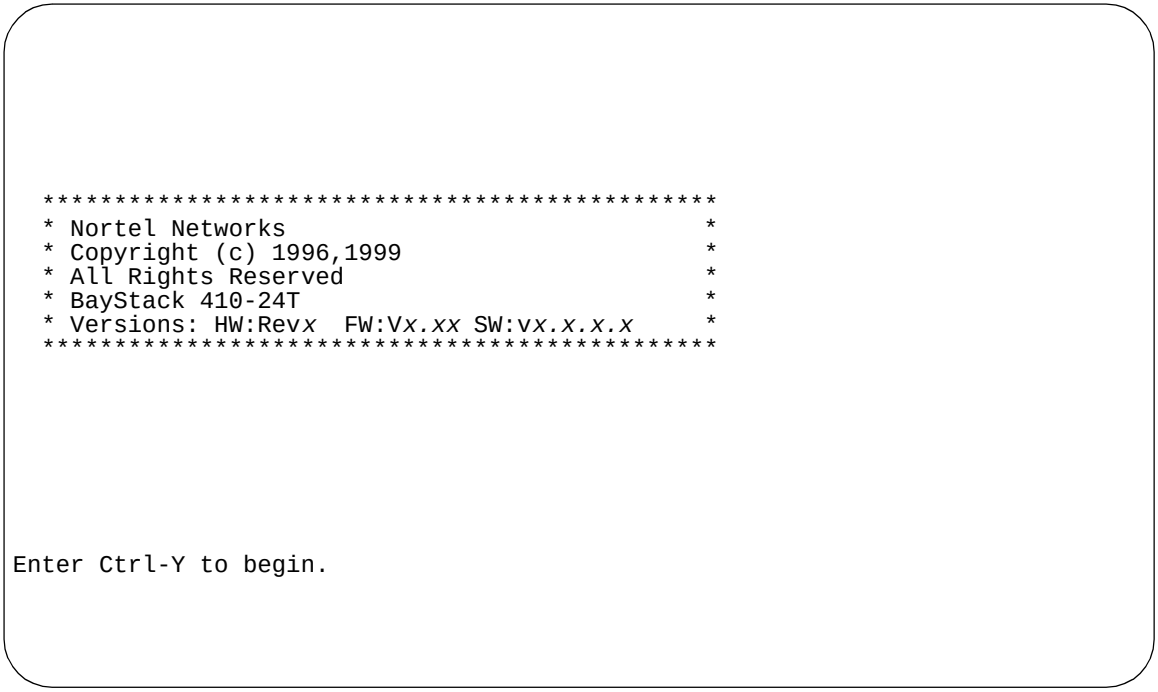


Figure 3-42. Nortel Networks Logo Screen

Note: The Nortel Networks logo screen for your switch will display the BayStack 410-24T model number and the current hardware, firmware, and software versions.

Upon successful completion of the power-up self-tests, the switch is ready for normal operation.

To access the BayStack 410-24T main menu, press [Ctrl]-Y.

Reset to Default Settings

Caution: If you choose the Reset to Default Settings command, all of your configured settings will be replaced with factory default settings when you press [Enter].

Achtung: Bei Auswahl des Befehls zur Rücksetzung auf die Standardeinstellungen werden alle von Ihnen konfigurierten Einstellungen durch die werkseitigen Standardeinstellungen ersetzt, wenn Sie die Eingabetaste drücken.

Attention: Si vous restaurez la configuration usine, votre configuration courante sera remplacée par la configuration usine dès que vous appuierez sur [Entrée].

Precaución: Si selecciona el comando Restaurar valores predeterminados, todos los valores de configuración se sustituirán por las valores predeterminados en fábrica al pulsar [Intro].

Attenzione: Nel caso in cui si selezioni la reimpostazione dei valori di default, tutte le impostazioni configurate verranno sostituite dai default di fabbrica premendo il tasto [Invio].

注意: 「デフォルトの設定にリセット」コマンドを選択すると、現在のコンフィグレーションされた設定は、[Enter]を押したとき、工場出荷時の設定に変更されます。

The Reset to Default Settings option (accessed from the main menu) allows you to reset a standalone switch, a specific unit in a stack configuration, or an entire stack, and replace all configured switch parameters with the default values. To view default values, see Appendix E, “Default Settings.”

The Reset to Default Settings option takes approximately 5 seconds to complete. During this time, the switch initiates a self-test that comprises various diagnostic routines and subtests. The LEDs display various patterns to indicate that the subtests are in progress.

The results of the self-test are displayed briefly (5 or 10 seconds) in the Self-Test screen (Figure 3-43), which is followed by the Nortel Networks logo screen (Figure 3-44).

```
BayStack 410-24T Self-Test

   CPU RAM test                    ... Pass
   ASIC addressing test            ... Pass
   ASIC buffer RAM test            ... Pass
   ASIC buffer stack init test     ... Pass
   Port internal loopback test     ... Pass
   Cascade SRAM test               ... Pass
   Fan test                        ... Pass

Self-test complete.
```

Figure 3-43. Self-Test Screen After Resetting to Default Settings

Note: The Self-Test screen remains displayed only if the self-test detects a fatal error.

```
  ********************************************
  * Nortel Networks                          *
  * Copyright (c) 1996,1999                  *
  * All Rights Reserved                      *
  * BayStack 410-24T                         *
  * Versions: HW:Revx  FW:Vx.xx SW:vx.x.x.x  *
  ********************************************




Enter Ctrl-Y to begin.
```

Figure 3-44. Nortel Networks Logo Screen After Resetting to Default Settings

Note: The Nortel Networks logo screen for your switch displays the BayStack 410-24T model number and the current hardware, firmware, and software versions.

Upon successful completion of the power-up self-tests, the switch is ready for normal operation.

To access the BayStack 410-24T main menu, press [Ctrl]-Y.

Logout

The Logout option (accessed from the main menu) allows a user working at a password-protected console terminal or in an active TELNET session to terminate the session.

The Logout option works as follows:

- If you are accessing the BayStack 410-24T switch through a TELNET session, the Logout option terminates the TELNET session.
- If you are accessing the BayStack 410-24T switch through a password-protected console terminal (connected to the console/comm port on the switch), the Logout option displays the console-terminal password prompt (Figure 3-45). If RADIUS authentication is enabled, the password field is preceded by a username field. You must enter the correct password (and username, if applicable) to access the CI screens.

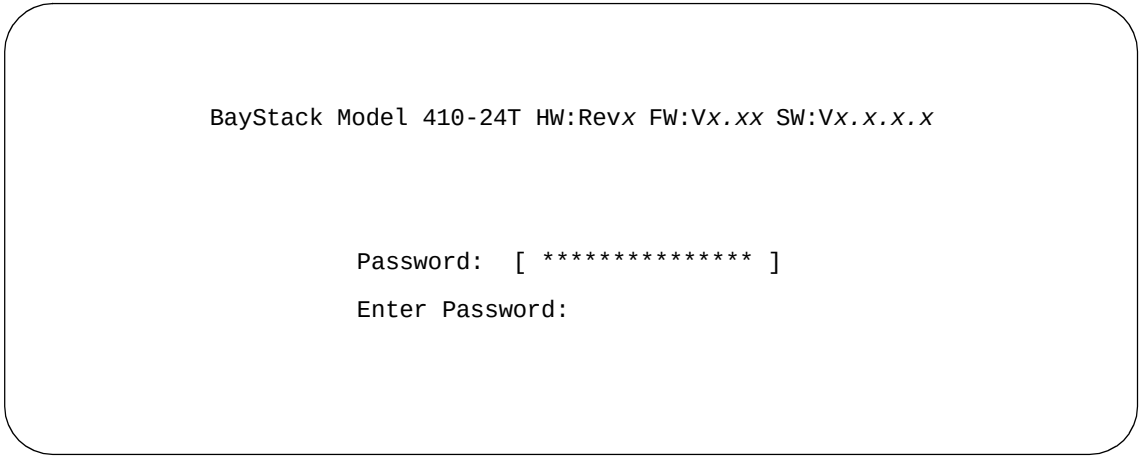


Figure 3-45. Password Prompt Screen

You can specify whether a password is required for the TELNET session or the console terminal using the Console/Comm Port Configuration screen (see "Console/Comm Port Configuration" on page 3-65).

If the console terminal is not password protected, the system ignores the Logout option.

Chapter 4
Troubleshooting

This chapter describes how to isolate and diagnose problems with your BayStack 410-24T switch.

This chapter covers the following topics:

- Interpreting the LEDs
- Diagnosing and correcting the problem

  -- Normal power-up sequence

  -- Port connection problems
- Software download error codes

The chapter topics lead you through a logical process for troubleshooting the BayStack 410-24T switch. For example, because LEDs provide visual indications of certain problems, refer to "Interpreting the LEDs" on page 4-2 to understand the various states (see Table 4-1) that your switch LEDs can exhibit during normal operation.

For more help in determining the problem, "Diagnosing and Correcting the Problem" on page 4-4 describes symptoms and corrective actions (see Table 4-2) you can perform to resolve specific problems. Subsequent sections give step-by-step procedures to correct the problems.

Interpreting the LEDs

Figure 4-1 shows the LED display panel used with the BayStack 410-24T switch. Table 4-1 describes the LEDs.

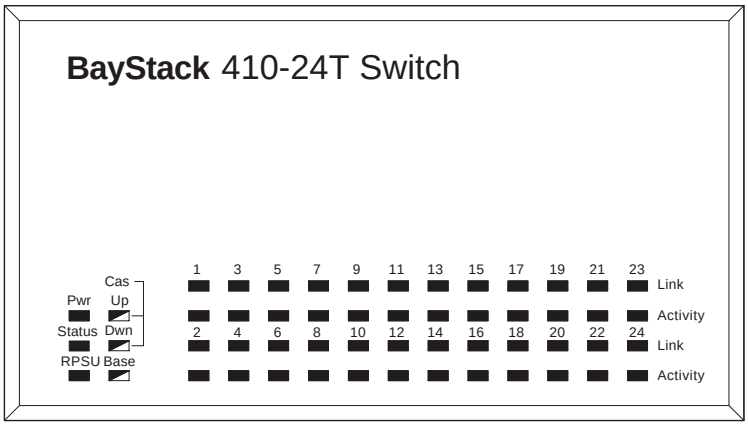


Figure 4-1. BayStack 410-24T Switch LED Display Panel

Table 4-1. BayStack 410-24T Switch LED Descriptions

Label	Type	Color	State	Meaning
Pwr	Power status	Green	On	DC power is available to the switch's internal circuitry.
			Off	No AC power to switch, or power supply failed.
Status	System status	Green	On	Self-test passed successfully and switch is operational.
			Blinking	A nonfatal error occurred during the self-test.
			Off	The switch failed the self-test.
RPSU	RPSU status	Green	On	The switch is connected to the HRPSU and can receive power if needed.
			Off	The switch is not connected to the HRPSU or HRPSU is not supplying power.
CAS Up	Stack mode		Off	The switch is in standalone mode.

(continued)

Table 4-1. BayStack 410-24T Switch LED Descriptions *(continued)*

Label	Type	Color	State	Meaning
		Green	On	The switch is connected to the *upstream* unit's Cascade A In connector.
		Amber	On	The Cascade A Out connector (CAS Up) for this switch is looped internally (wrapped to the secondary ring).
		Amber or Green	Blinking	Incompatible software revision or unable to obtain a unit ID (Renumber Stack Unit table full). The unit is on the ring but cannot participate in the stack configuration.
CAS Dwn	Stack mode		Off	The switch is in standalone mode.
		Green	On	The switch is connected to the *downstream* unit's Cascade A Out connector.
		Amber	On	The Cascade A In connector (CAS Dwn) for this switch is looped internally (wrapped to the secondary ring).
		Amber or Green	Blinking	Incompatible software revision or unable to obtain a unit ID (Renumber Stack Unit table full). The unit is on the ring but cannot participate in the stack configuration.
Base	Base mode	Green	On	The switch is configured as the stack base unit.
			Off	The switch is *not* configured as the stack base unit (or is in standalone mode).
			Blinking	Stack configuration error: Indicates that *multiple* base units or *no* base units are configured in the stack.
		Amber	On	This unit is operating as the stack configuration's *temporary base unit*. This condition occurs automatically if the base unit (directly downstream from this unit) fails. If this happens, the following events take place: • The two units directly upstream and directly downstream from the failed unit automatically wrap their cascade connectors and indicate this condition by lighting their Cas Up and Cas Dwn LEDs (see Cas Up and Cas Dwn description in this table). • If the temporary base unit fails, the next unit directly downstream from this unit becomes the new temporary base unit. This process can continue until there are only two units left in the stack configuration.

(continued)

Table 4-1. BayStack 410-24T Switch LED Descriptions *(continued)*

Label	Type	Color	State	Meaning
				This automatic process is a temporary safeguard only. If the stack configuration loses power, the temporary base unit will not power up as the base unit when power is restored. For this reason, you should always assign the temporary base unit as the base unit (set the Unit Select switch to Base) until the failed unit is repaired or replaced.
Link	10 Mb/s port speed indicator	Green	On	The corresponding port is set to operate at 10 Mb/s and the link is good.
		Green	Blinking	The corresponding port has been disabled by software.
			Off	The link connection is bad or there is no connection to this port.
Activity	Port activity	Green	Blinking	Indicates network activity for the corresponding port. A high level of network activity can cause the LEDs to appear to be on continuously.

Diagnosing and Correcting the Problem

Before you perform the problem-solving steps in this section, cycle the power to the BayStack 410-24T switch (disconnect and then reconnect the AC power cord); then, verify that the switch follows the normal power-up sequence.

Warning: To avoid bodily injury from hazardous electrical current, never remove the top cover of the device. There are no user-serviceable components inside.

Vorsicht: Um Verletzungsgefahr durch einen elektrischen Stromschlag auszuschließen, nehmen Sie niemals die obere Abdeckung vom Gerät ab. Im Geräteinnern befinden sich keine Komponenten, die vom Benutzer gewartet werden können.

Avertissement: Pour éviter tout risque d'électrocution, ne jamais retirer le capot de l'appareil. Cet appareil ne contient aucune pièce accessible par l'utilisateur.

Advertencia: A fin de evitar daños personales por corrientes eléctricas peligrosas, no desmonte nunca la cubierta superior de este dispositivo. Los componentes internos no son reparables por el usuario.

Avvertenza: Per evitare lesioni fisiche dovute a scariche pericolose di corrente, non rimuovere mai il coperchio superiore del dispositivo. I componenti interni non possono essere manipolati dall'utente.

警告: 危険な電流から身体を保護するために、ディバイスの上部カバーを決して取り外さないでください。内部には、ユーザが扱うコンポーネントはありません。

Normal Power-Up Sequence

In a normal power-up sequence, the LEDs appear as follows:

1. After power is applied to the switch, the Pwr (Power) LED turns on within 5 seconds.
2. The switch initiates a self-test, during which the port LEDs display various patterns to indicate the progress of the self-test.
3. Upon successful completion of the self-test (within 10 seconds after power is applied), the Status LED turns on.
4. The remaining port LEDs indicate their operational status, as described in Table 4-2.

Table 4-2. Corrective Actions

Symptom	Probable cause	Corrective action
All LEDs are off.	The switch is not receiving AC power.	Verify that the AC power cord is fastened securely at both ends and that power is available at the AC power outlet
	The fans are not operating or the airflow is blocked, causing the unit to overheat.	Verify that there is sufficient space for adequate airflow on both sides of the switch.

(continued)

Table 4-2. Corrective Actions *(continued)*

Symptom	Probable cause	Corrective action
	.	**Note:** Operating temperature for the switch must not exceed 40°C (104°F). Do not place the switch in areas where it can be exposed to direct sunlight or near warm air exhausts or heaters.
The Activity LED for a connected port is off or does not blink (and you have reason to believe that traffic is present).	The switch is experiencing a port connection problem. The switch's link partner is not autonegotiating properly.	See "Port Connection Problems" on page 4-6.
The Status LED is off.	A fatal error was detected by the self-test.	Cycle the power to the switch (disconnect and then reconnect the AC power cord). If the problem persists, replace the switch.
The Status LED is blinking.	A nonfatal error occurred during the self-test.	Cycle the power to the switch (disconnect and then reconnect the AC power cord). If the problem persists, contact the Nortel Networks Technical Solutions Center.

Port Connection Problems

You can usually trace port connection problems to either a poor cable connection or an improper connection of the port cables at either end of the link. To remedy these types of problems, make sure that the cable connections are secure and that the cables connect to the correct ports at both ends of the link.

Port connection problems are also traceable to the autonegotiation mode or the port interface.

Autonegotiation Modes

Port connection problems can occur when a port is connected to a station that is not operating in a compatible mode (for example, connecting a full-duplex port to a half-duplex port). The BayStack 410-24T switch negotiates port speeds according to the IEEE 802.3u autonegotiating standard. The switch adjusts (autonegotiates) the port speed and duplex mode to match the best service provided by the connected station, up to 100 Mb/s in full-duplex mode with an optional 100BASE-T MDA installed.

- If the connected station uses a form of autonegotiation that is not compatible with the IEEE 802.3u autonegotiating standard, the BayStack 410-24T switch cannot negotiate a compatible mode for correct operation.
- If the autonegotiation feature is not present or not enabled at the connected station, the BayStack 410-24T switch may not be able to determine the correct duplex mode.

In both situations, the BayStack 410-24T switch "autosenses" the speed of the connected station and, by default, reverts to half-duplex mode. If the connected station is operating in full-duplex mode, it cannot communicate with the switch.

To correct this mode mismatch problem:

1. **Use the Port Configuration screen to disable autonegotiation for the suspect port (see "Port Configuration" on page 3-36).**
2. **Manually set the Speed/Duplex field to match the speed/duplex mode of the connected station (see Table 3-14 on page 3-37).**

   You may have to try several settings before you find the correct speed/duplex mode of the connected station.

If the problem persists:

1. **Disable the autonegotiation feature at the connected station.**
2. **Manually set the speed/duplex mode of the connected station to the same speed/duplex mode you have manually set for the BayStack 410-24T switch port.**

Port Interface

Ensure that the devices are connected using the appropriate crossover or straight-through cable (see Appendix D, "Connectors and Pin Assignments").

Software Download Error Codes

Table 4-3 describes error codes that are associated with the software download process. The error codes appear only on the console screen of the switch that is connected to your TFTP load host during the software download process.

If an error code appears during the download process, perform the appropriate corrective action provided in Table 4-3. If the suggested corrective action does not resolve the problem, contact your Nortel Networks Technical Solutions Center (see "How to Get Help" in the Preface section of this guide).

Table 4-3. Software Download Error Codes

Error code	Description	Corrective action
2001	Download process failed to transmit packet to other stack units.	Check the stack cable connections, then repeat the software download process.
2002	TFTP load host failed to respond to ARP request.	Verify that your TFTP load host is operational and check that the connectivity between the switch/stack and the TFTP load host is valid.
2003	Received image failed CRC check.	Verify that the switch software image is valid (not corrupted) and repeat the software download process.
2004	The download process has lost synchronization with the TFTP load host.	Verify that your TFTP load host is operational, then repeat the software download process.
2005	TFTP timeout. The software download has timed out due to network congestion or the load host has stopped responding.	Verify that your TFTP load host is operational, then repeat the software download process.
2006	File access error.	Check that the file name of the software image is correct, and that the file protection is properly set for access.
2007	Non-data packet received from the TFTP load host.	Check that the file name of the software image is correct.
2008	Requested software image is too large.	Check that the file name of the software image is correct, and that you are accessing the appropriate software image for your switch.

(continued)

Table 4-3. Software Download Error Codes *(continued)*

Error code	Description	Corrective action
2009	Received image failed CRC check.	Verify that the switch software image is valid (not corrupted) and repeat the software download process.
2010	No MAC address found in EEPROM.	Contact the Nortel Networks Technical Solutions Center.

Chapter 5
Technical Specifications

This appendix lists the technical specifications for the BayStack 410-24T switch.

Environmental

Parameter	Operating Specification	Storage Specification
Temperature	0° to 40°C (32° to 104°F)	-25° to 70°C (-13° to 158°F)
Humidity	85% maximum relative humidity, noncondensing	95% maximum relative humidity, noncondensing
Altitude	3024 m (10,000 ft)	3024 m (10,000 ft)

Electrical

Parameter	Specifications
Input Voltage	100 to 240 VAC @ 47 to 63 Hz
Input Power Consumption	100 W maximum
Input Volt Amperes Rating	150 VA maximum
Input Current	1.5 to 0.6A @ 100 VAC
Maximum Thermal Output	500 BTU/hr

Physical Dimensions

Parameter	Specifications
Height	7.03 cm (2.77 in.)
Width	44.20 cm (17.40 in.)
Depth	34.29 cm (13.50 in.)
Weight	3.46 kg (7.63 lb)

Performance Specifications

Parameter	Specifications
Frame Forward Rate (64-byte packets)	Up to 1 million packets per second (pps) maximum, learned unicast traffic
Port Forwarding/Filtering Performance (64-byte packets)	• For fixed 10BASE-T ports: 14,880 pps maximum • For 100BASE-T MDA ports: 148,810 pps maximum
Address Database Size	16,000 entries at line rate (32,000 entries without flooding)
Addressing	48-bit MAC address
Frame Length	64 to 1518 bytes (IEEE 802.1Q Untagged) 64 to 1522 bytes (IEEE 802.1Q Tagged)

Network Protocol and Standards Compatibility

- IEEE 802.1p (Prioritizing)
- IEEE 802.1Q (VLAN Tagging)
- IEEE 802.3 10BASE-T (ISO/IEC 8802-3, Clause 14)
- IEEE 802.3u 100BASE-FX (ISO/IEC 8802-3, Clause 26)
- IEEE 802.3u 100BASE-TX (ISO/IEC 8802-3, Clause 25)
- IEEE 802.3x (Full Duplex operation)
- IEEE 802.3z (Gigabit plus Flow Control)

Data Rate

- 10 Mb/s Manchester encoded (or 100 Mb/s 4B/5B encoded for 100BASE-T MDA)

Interface Options

- 10BASE-T -- RJ-45 (8-pin modular) connectors for MDI-X interface (Fixed ports 1-24)
- 10BASE-T/100BASE-TX -- RJ-45 (8-pin modular) connectors for MDI-X interface (Optional MDA ports 25-28)
- 100BASE-FX Fiber -- (Optional MDA ports 25-28 only) SC and MT-RJ connectors for switched 100 Mb/s (100BASE-FX) connections over 50/125 and 62.5/125 micron multimode fiber optic cable (2 km/6,562 ft maximum distance)

Safety Agency Certification

- UL Listed (UL 1950)
- IEC 950/EN60950 (CB report)
- C22.2 No. 950 (cUL)
- NOM (NOM-019)

Electromagnetic Emissions

- US. CFR47, Part 15, Subpart B, Class A
- Canada. ICES-003, Issue 2, Class A
- Australia/New Zealand. AS/NZS 3548:1995, Class A
- Japan. V-3/97.04:1997, Class A
- Taiwan. CNS 13438, Class A
- EN55022:1995, Class A
- EN61000-3-2:1995
- EN61000-3-3:1994

Electromagnetic Immunity

- EN50082-1:1997

Declaration of Conformity

The Declaration of Conformity for the BayStack 410-24T switches complies with ISO/IEC Guide 22 and EN45014. The declaration identifies the product models, the Nortel Networks name and address, and the specifications recognized by the European community.

As stated in the Declaration of Conformity, the BayStack 410-24T switches comply with the provisions of Council Directives 89/336/EEC and 73/23/EEC.

Chapter 5
Media Dependent Adapters

This appendix describes the optional media dependent adapters (MDAs) that are available from Nortel Networks. The MDAs can support high-speed connections to servers, shared Fast Ethernet hubs, or backbone devices.

Note: The MDA is *not* hot-swappable. Power down the switch before installing or removing an MDA.

The following MDA models are available:

Type	Model/Description	See Page:
10BASE-T/100BASE-TX	400-4TX MDA -- 4-port twisted pair RJ-45 connectors.	5-2
100BASE-FX (Fiber)	400-2FX MDA -- 2-port multimode fiber SC connectors. 400-4FX MDA -- 4-port multimode fiber MT-RJ connectors.	5-3

Nortel Networks is constantly adding new models and features to existing product lines. See your Nortel Networks sales representative for a full range of available MDAs.

Note: The BayStack 410-24T switch does not support Gigabit MDAs.

10BASE-T/100BASE-TX MDA

The 400-4TX MDA (Figure 5-1) uses four 10BASE-T/100BASE-TX RJ-45 (8-pin modular) port connectors to attach Ethernet devices. Table 5-1 describes the 400-4TX MDA components and LEDs.

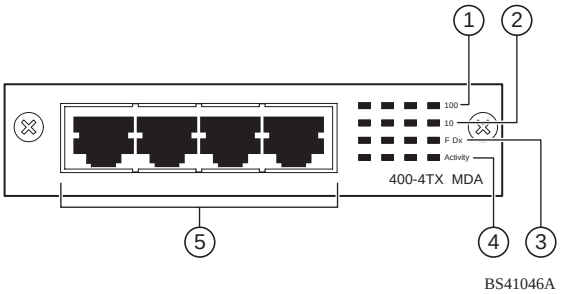


Figure 5-1. 400-4TX MDA Front Panel

Table 5-1. 400-4TX MDA Components

Item	Label	Description
1	100	100BASE-TX port status LEDs (green): On: The corresponding port is set to operate at 100 Mb/s. Off: The link connection is bad or there is no connection to this port. Blinking: The corresponding port is management disabled.
2	10	10BASE-T port status LEDs (green): On: The corresponding port is set to operate at 10 Mb/s. Off: The link connection is bad or there is no connection to this port. Blinking: The corresponding port is management disabled.
3	F Dx	Full-duplex port status LEDs (green): On: The corresponding port is in full-duplex mode. Off: The corresponding port is in half-duplex mode.
4	Activity	Port activity LEDs (green): Blinking: Indicates the network activity level for the corresponding port. A high level of network activity can cause LEDs to appear to be on continuously.
5		10BASE-T/100BASE-TX RJ-45 (8-pin modular) port connectors.

The RJ-45 ports are configured as media-dependent interface-crossover (MDI-X) connectors. These ports connect over straight cables to the network interface controller (NIC) card in a node or server, similar to a conventional Ethernet repeater hub. If you are connecting to another Ethernet hub or Ethernet switch, you need a crossover cable unless an MDI connection exists on the associated port of the attached device.

The 400-4TX MDA can operate at either 10 Mb/s or 100 Mb/s. The speed is determined through autonegotiation with its connecting device.

For installation instructions, see "Installing an MDA" on page 5-6.

100BASE-FX MDAs

Warning: Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Vorsicht: Glasfaserkomponenten können Laserlicht bzw. Infrarotlicht abstrahlen, wodurch Ihre Augen geschädigt werden können. Schauen Sie niemals in einen Glasfaser-LWL oder ein Anschlußteil. Gehen Sie stets davon aus, daß das Glasfaserkabel an eine Lichtquelle angeschlossen ist.

Avertissement: L'équipement à fibre optique peut émettre des rayons laser ou infrarouges qui risquent d'entraîner des lésions oculaires. Ne jamais regarder dans le port d'un connecteur ou d'un câble à fibre optique. Toujours supposer que les câbles à fibre optique sont raccordés à une source lumineuse.

Advertencia: Los equipos de fibra óptica pueden emitir radiaciones de láser o infrarrojas que pueden dañar los ojos. No mire nunca en el interior de una fibra óptica ni de un puerto de conexión. Suponga siempre que los cables de fibra óptica están conectados a una fuente luminosa.

Avvertenza: Le apparecchiature a fibre ottiche emettono raggi laser o infrarossi che possono risultare dannosi per gli occhi. Non guardare mai direttamente le fibre ottiche o le porte di collegamento. Tenere in considerazione il fatto che i cavi a fibre ottiche sono collegati a una sorgente luminosa.

警告：光ファイバ装置は目に有害なレーザー光や赤外線を放射するこ
あります。光ファイバやコネクタ・ポートを覗き込まないでくださ
光ファイバ・ケーブルは光源に接続されているものと思ってくださ

There are two 100BASE-FX models (Figure 5-2):

- 400-2FX MDA

  The 400-2FX MDA uses two longwave 1300 nm SC connectors to attach devices over 62.5/125 micron multimode fiber optic cable.

- 400-4FX MDA

  The 400-4FX MDA uses four longwave 1300 nm MT-RJ connectors to attach devices over 62.5/125 micron multimode fiber optic cable.

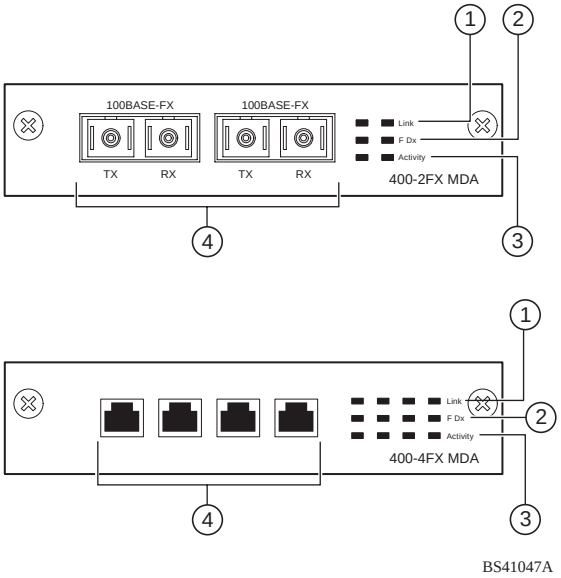


Figure 5-2. 100BASE-FX MDA Front Panels

Both models conform to the IEEE 802.3u 100BASE-FX standard and can be used to attach fiber-based 100 Mb/s connections to other compatible Fast Ethernet devices. Single-mode fiber cable is not supported.

Table 5-2 describes the 100BASE-FX components and LEDs.

For installation instructions, see "Installing an MDA" on page 5-6.

Table 5-2. 100BASE-FX MDA Components

Item	Label	Description
1	Link	Communications link LEDs (green): On: Valid communications link established. Off: The communications link connection is bad or there is no connection to this port. Blinking: The corresponding port is management disabled.
2	F Dx	Full-duplex port status LEDs (green): On: The corresponding port is in full-duplex mode. Off: The corresponding port is in half-duplex mode.
3	Activity	Port activity LEDs (green): Blinking: Indicates the network activity level for the corresponding port. A high level of network activity can cause LEDs to appear to be on continuously.
4		100BASE-FX port connectors: • Model 400-2FX uses SC connectors. • Model 400-4FX uses MT-RJ connectors.

Installing an MDA

The Uplink Module slot on the BayStack 450 switches accommodates a single MDA. The connection can be either a 10/100BASE-TX MDA with an RJ-45 connector or a (fiber) 100BASE-FX MDA with an SC or MT-RJ connector.

Note: The MDA is *not* hot-swappable. Power down the switch before installing or removing an MDA.

To install an MDA into the Uplink Module slot:

1. **Unplug the AC power cord from the back of the switch.**
2. **Loosen the thumb screws and remove the filler panel (or previously installed MDA) from the Uplink Module slot.**

Note: If you are replacing an installed MDA with another type of MDA, see "Replacing an MDA with a Different Model" on 5-7.

3. **Insert the MDA into the Uplink Module slot guides (Figure 5-3).**

   Make sure the MDA slides in on the guides provided. Failure to align the guides could result in bent and broken pins

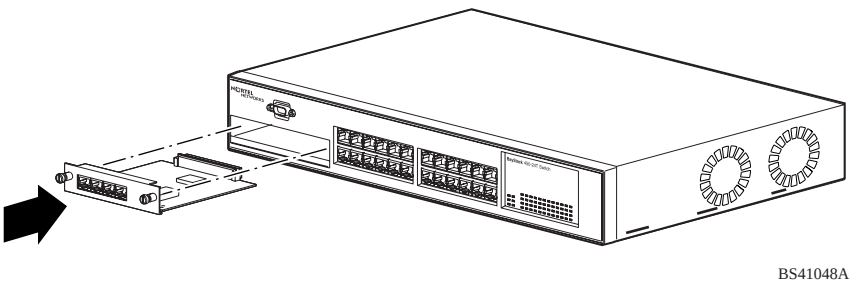


Figure 5-3. Installing an MDA

4. **Press the MDA *firmly* into the Uplink Module slot.**

   Be sure that the MDA is fully seated into the mating connector.

5. **Secure the MDA by tightening the thumb screws on the MDA front panel.**

6. **Attach devices to the MDA ports (see "Attaching Devices to the BayStack 410-24T Switch" on page 2-7).**

After connecting the port cables, continue to follow the instructions to connect power and verify the installation.

Note: The IEEE 802.3u specification requires that all ports operating at 100 Mb/s use only Category 5 unshielded twisted pair (UTP) cabling.

Replacing an MDA with a Different Model

When replacing an installed MDA with another type of MDA, complete the following steps to clear the switch NVRAM:

1. **Power down the switch.**

   Remove the AC power cord from the power source.

2. **Remove the installed MDA.**

   Loosen the thumbscrews and remove the MDA.

3. **Install the replacement MDA.**

   Be sure to *firmly* tighten the two thumbscrews on the MDA front panel.

4. **Power up the switch.**

Chapter 5
Quick Steps to Features

If you are a system administrator with experience configuring BayStack 410-24T switch VLANs, MultiLink Trunking, Port Mirroring, and IGMP Snooping, use the flowcharts on the following pages as quick configuration guides. The flowcharts refer you to the "configuration rules" appropriate for each feature.

The flowcharts cover the following features:

- 802.1Q VLANs
- MultiLink Trunks
- Port Mirroring
- IGMP Snooping

To learn more about:	Refer to this section:
802.1Q VLANs	"IEEE 802.1Q VLAN Workgroups" on page 1-32.
MultiLink Trunks	"MultiLink Trunks" on page 1-57.
Port Mirroring	"Port Mirroring (Conversation Steering)" on page 1-76.
IGMP Snooping	"IGMP Snooping" on page 1-48.

Configuring 802.1Q VLANs

To create or modify an 802.1Q VLAN, follow the flowcharts in Figures 5-1 to 5-3.

Choose VLAN Configuration (or press v) from the VLAN Configuration Menu screen to open the VLAN Configuration screen.

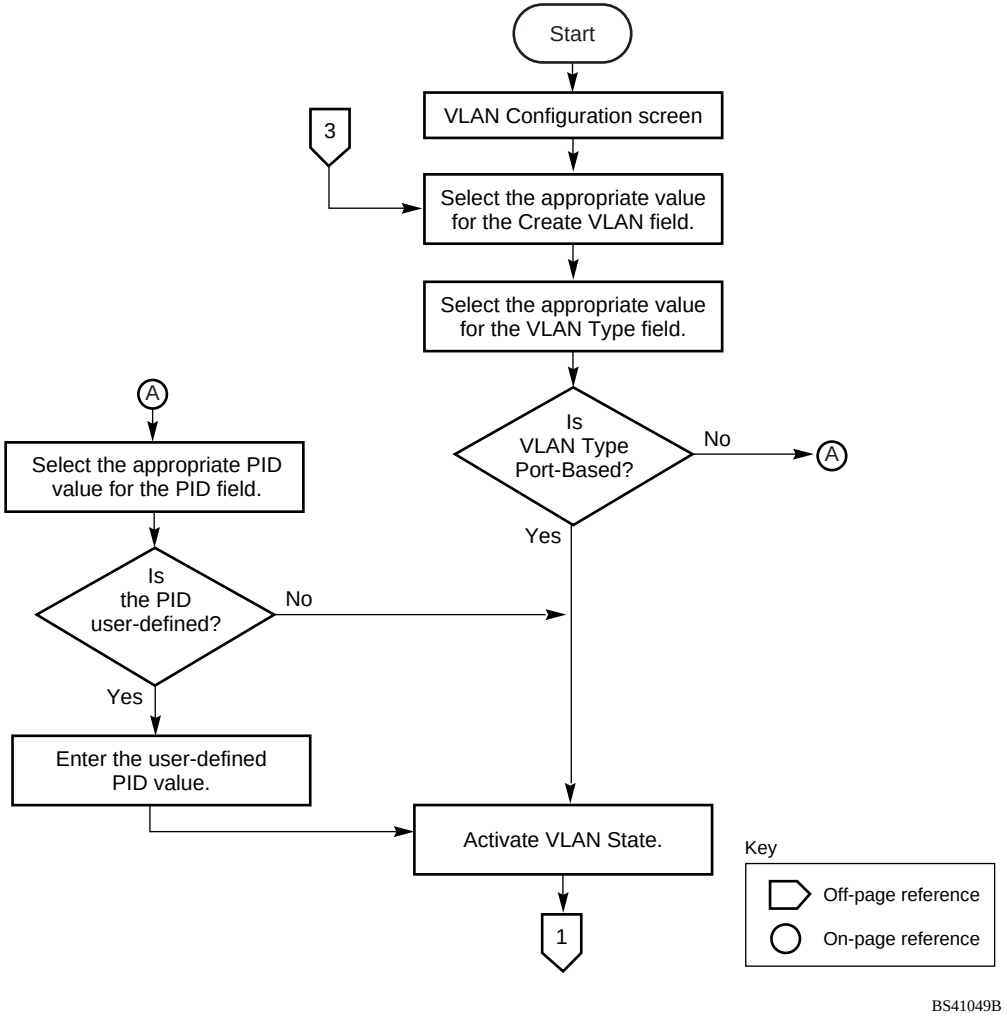


Figure 5-1. Configuring 802.1Q VLANs (1 of 3)

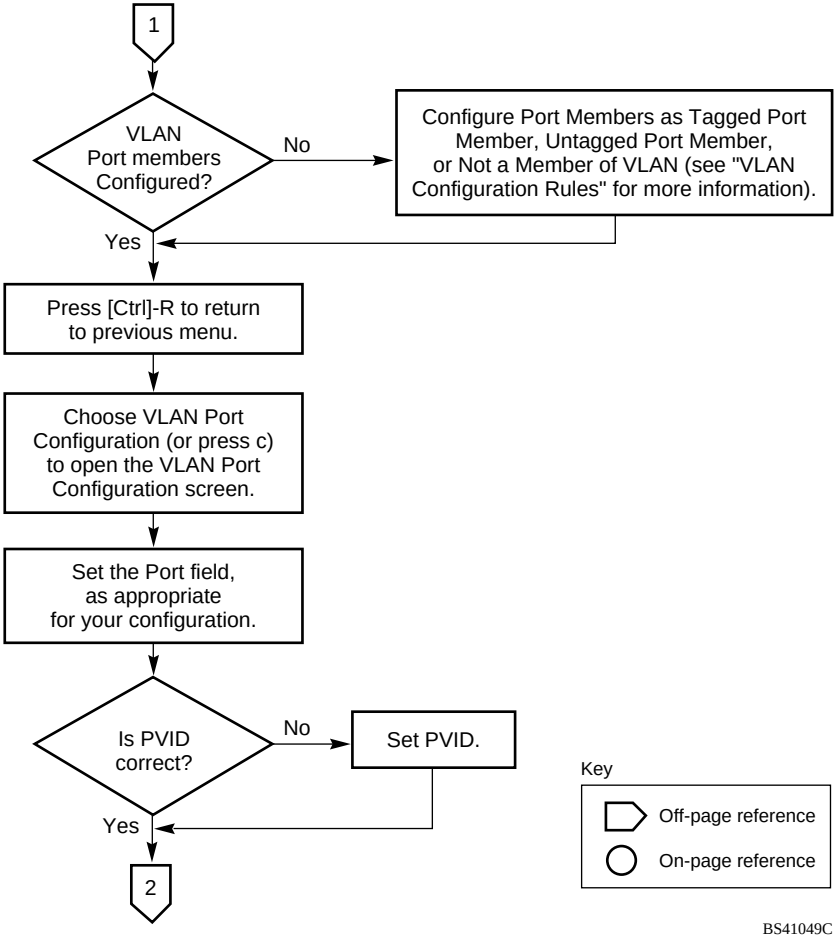


Figure 5-2. Configuring 802.1Q VLANs (2 of 3)

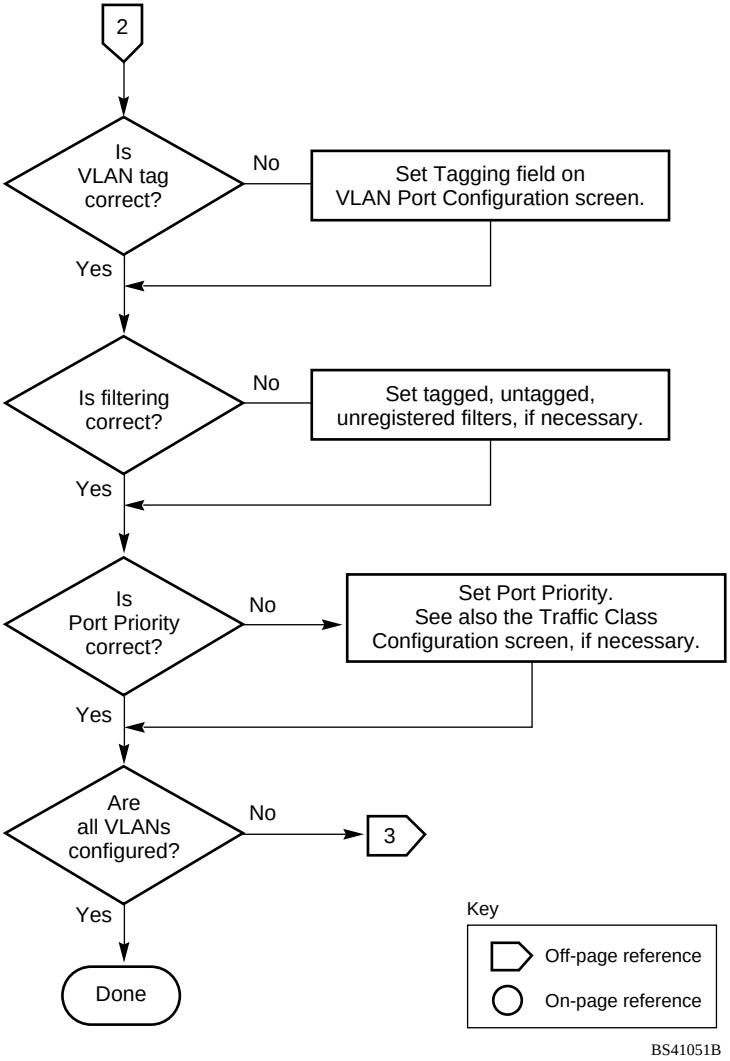


Figure 5-3. Configuring 802.1Q VLANs (3 of 3)

Configuring MultiLink Trunks

To create or modify a MultiLink trunk, follow the flowchart in Figure 5-4.

Choose MultiLink Trunk Configuration (or press t) from the MultiLink Trunk Configuration Menu screen to open the MultiLink Trunk Configuration screen.

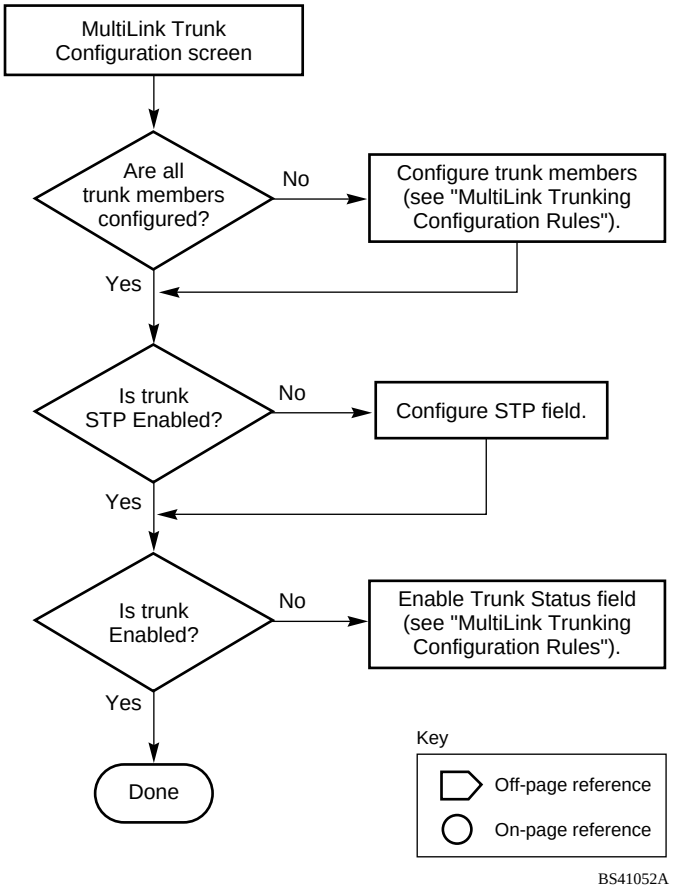


Figure 5-4. Configuring MultiLink Trunks

Configuring Port Mirroring

To create or modify port-mirroring ports, follow the flowcharts in Figures 5-5 and 5-6.

Choose Port Mirroring Configuration (or press i) from the Switch Configuration Menu screen to open the Port Mirroring Configuration screen.

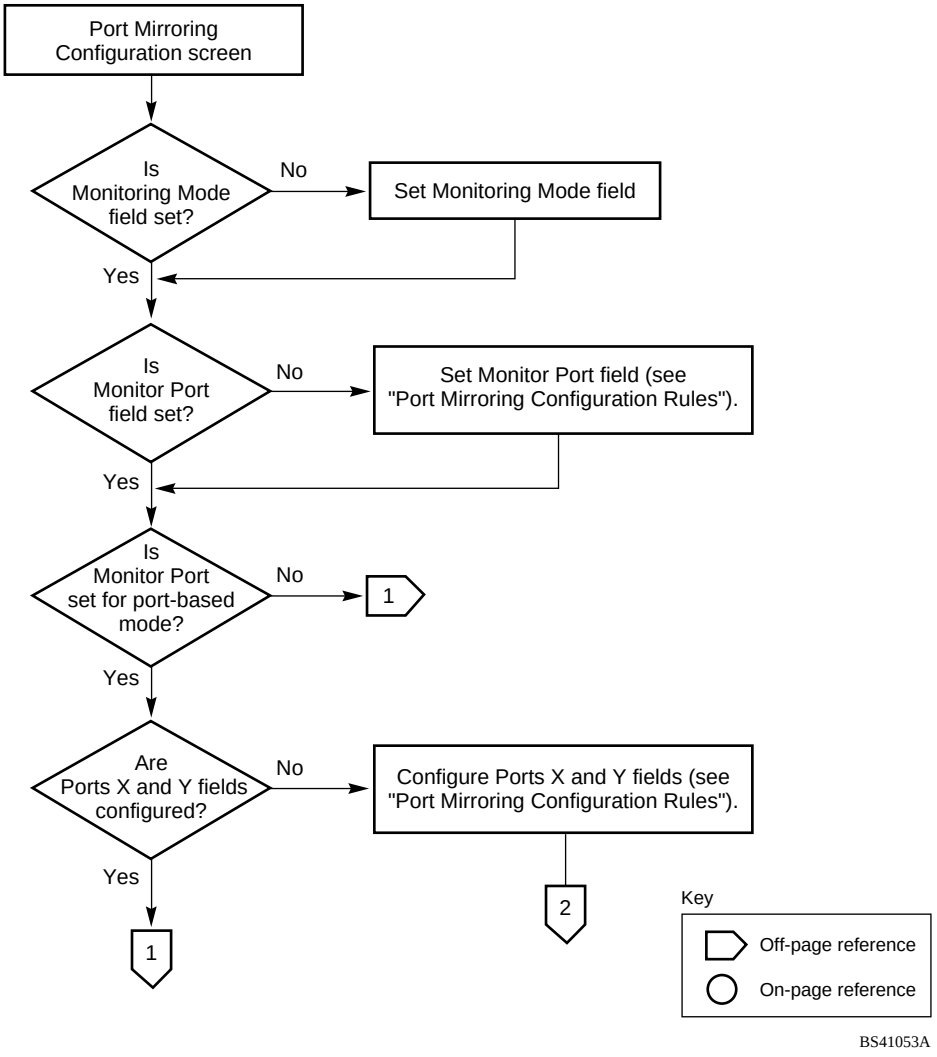


Figure 5-5. Configuring Port Mirroring (1 of 2)

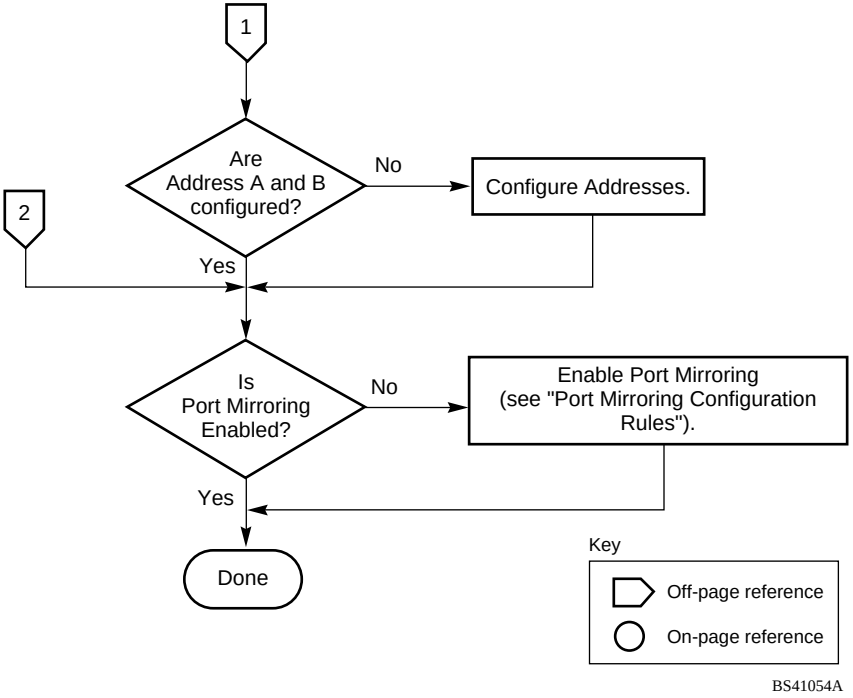


Figure 5-6. Configuring Port Mirroring (2 of 2)

Configuring IGMP Snooping

To create or modify IGMP Snooping ports, follow the flowcharts in Figures 5-7 to 5-9).

Choose IGMP Configuration (or press g) from the Switch Configuration Menu screen to open the IGMP Configuration screen.

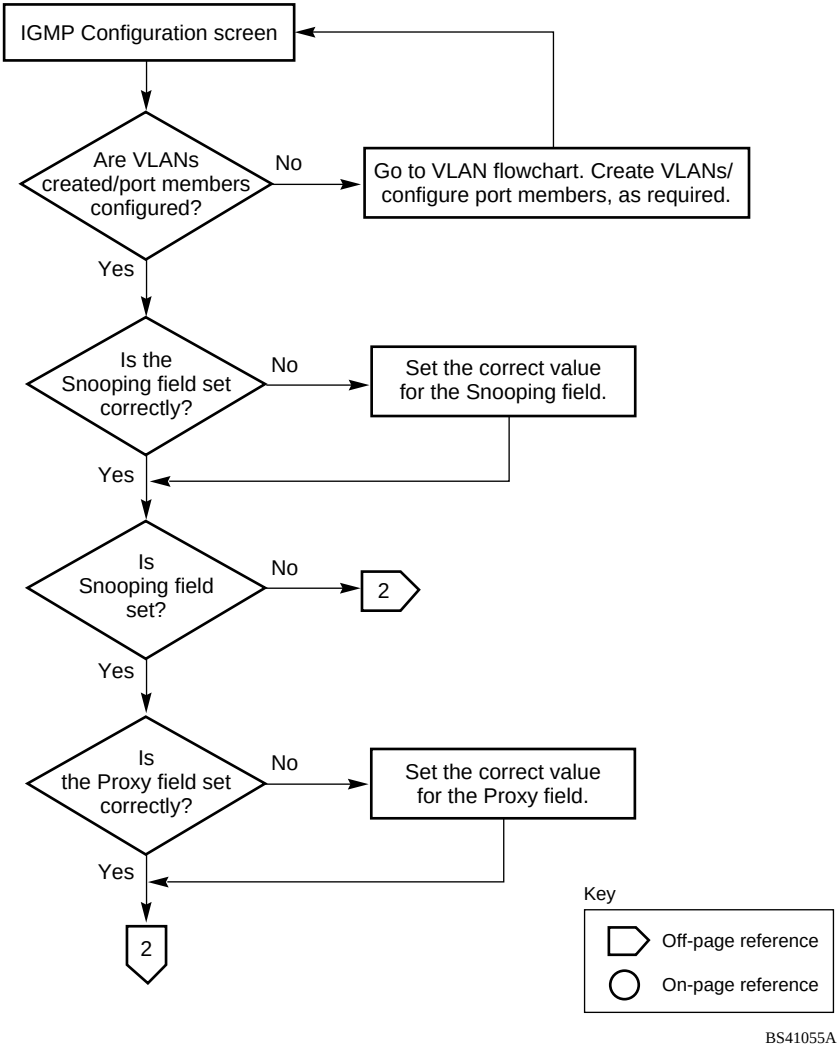


Figure 5-7. Configuring IGMP Snooping (1 of 3)

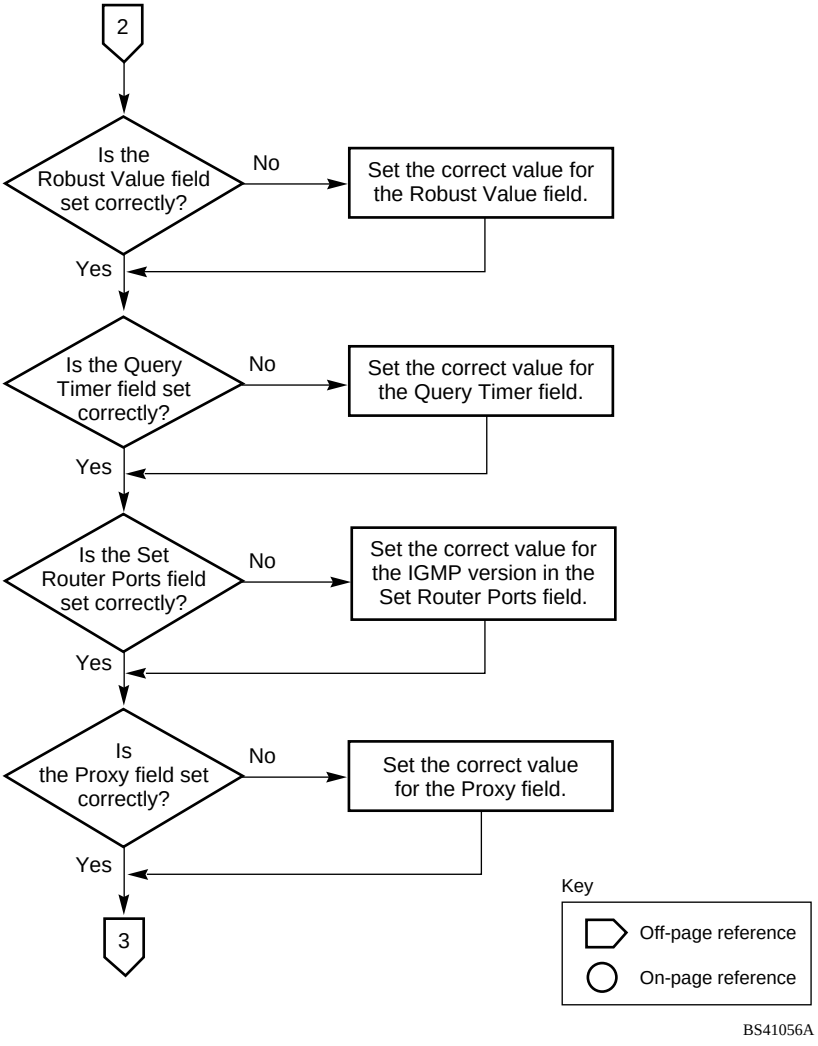


Figure 5-8. Configuring IGMP Snooping (2 of 3)

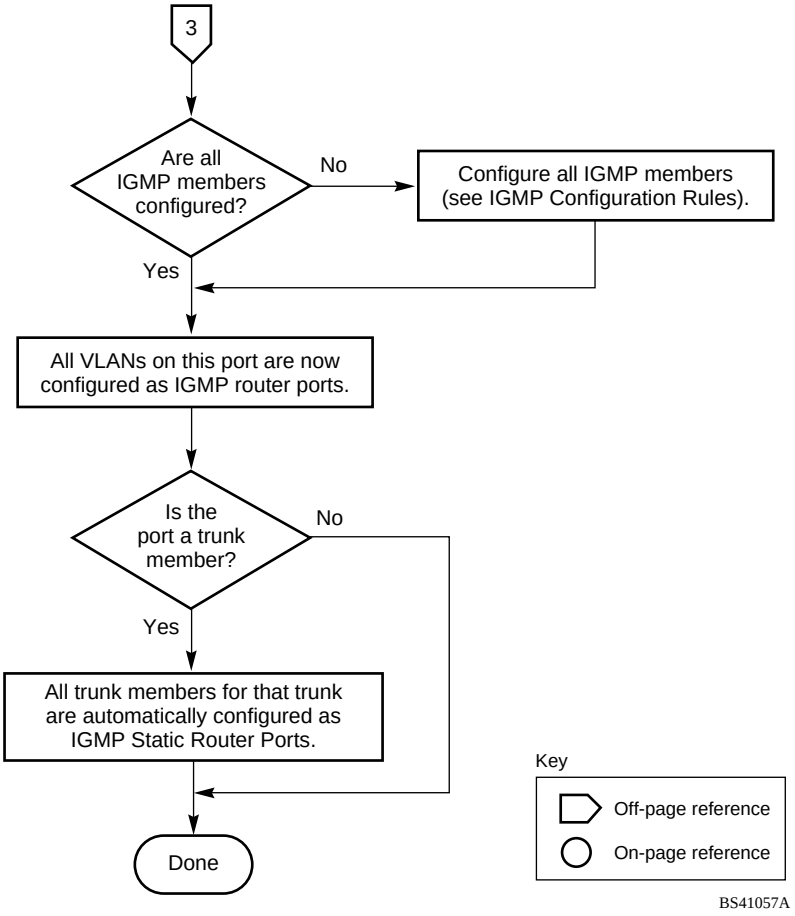


Figure 5-9. Configuring IGMP Snooping (3 of 3)

Chapter 5
Connectors and Pin Assignments

This appendix describes the BayStack 410-24T switch port connectors and pin assignments.

RJ-45 (10BASE-T/100BASE-TX) Port Connectors

The RJ-45 port connectors (Figure 5-1) are wired as MDI-X ports to connect end stations without using crossover cables. (See "MDI and MDI-X Devices" on page 5-2 for information about MDI-X ports.)

For 10BASE-T connections, use Category 3 (or higher) UTP cable. When using 10BASE-T/100BASE-TX MDAs, use only Category 5 UTP cable.

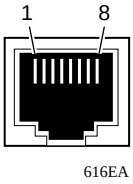


Figure 5-1. RJ-45 (8-Pin Modular) Port Connector

Table 5-1 lists the RJ-45 (8-pin modular) port connector pin assignments.

Table 5-1. RJ-45 Port Connector Pin Assignments

Pin	Signal	Description
1	RX+	Receive Data +
2	RX-	Receive Data -
3	TX+	Transmit Data +
4	Not applicable	Not applicable
5	Not applicable	Not applicable
6	TX-	Transmit Data -
7	Not applicable	Not applicable
8	Not applicable	Not applicable

MDI and MDI-X Devices

Media dependent interface (MDI) is the IEEE standard for the interface to unshielded twisted pair (UTP) cable.

For two devices to communicate, the transmitter of one device must connect to the receiver of the other device. The connection is established through a crossover function, which can be a crossover cable or a port that implements the crossover function internally.

Ports that implement the crossover function internally are known as MDI-X ports, where X refers to the crossover function.

Note: For the transmitter of one device to connect to the receiver of another device, the total number of crossovers must always be an odd number.

The following sections describe the use of straight-through and crossover cables for connecting MDI and MDI-X devices.

MDI-X to MDI Cable Connections

BayStack 410-24T switches use MDI-X ports that allow you to connect directly to end stations without using crossover cables (Figure 5-2).

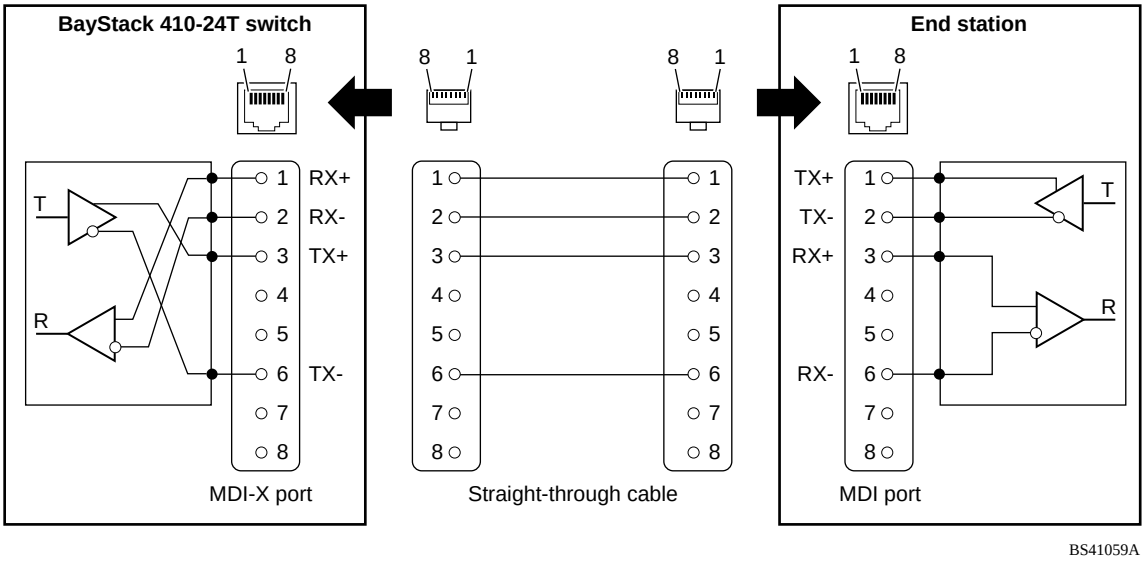


Figure 5-2. MDI-X to MDI Cable Connections

MDI-X to MDI-X Cable Connections

If you are connecting the BayStack 410-24T switch to a device that also implements MDI-X ports, use a crossover cable (Figure 5-3).

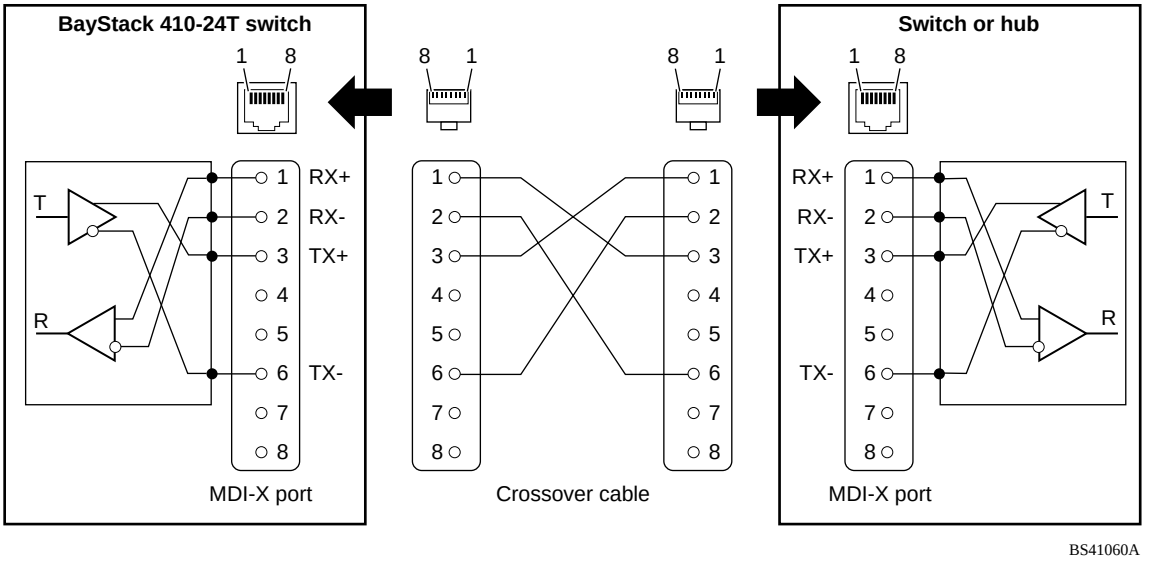


Figure 5-3. MDI-X to MDI-X Cable Connections

DB-9 (RS-232-D) Console/Comm Port Connector

The DB-9 Console/Comm Port connector (Figure 5-4) is configured as a data communications equipment (DCE) connector. The DSR and CTS signal outputs are always asserted; the CD, DTR, RTS, and RI signal inputs are not used. This configuration enables a management station (a PC or console terminal) to connect directly to the switch using a straight-through cable.

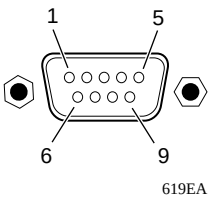


Figure 5-4. DB-9 Console/Comm Port Connector

Table 5-2 lists the DB-9 Console/Comm Port connector pin assignments.

Table 5-2. DB-9 Console/Comm Port Connector Pin Assignments

Pin	Signal	Description
1	CD	Carrier detect (not used)
2	TXD	Transmit data (output)
3	RXD	Receive data (input)
4	DTR	Data terminal ready (not used)
5	GND	Signal ground
6	DSR	Data set ready (output always asserted)
7	RTS	Request to send (not used)
8	CTS	Clear to send (output always asserted)
9	RI	Ring indicator (not used)
Shell		Chassis ground

Chapter 5
Default Settings

Table 5-1 lists the factory default settings for the BayStack 410-24T switch

Table 5-1. Factory Default Settings for the BayStack 410-24T Switch

Appears in this CI screen	Field	Default setting
IP Configuration/Setup (page 3-7)	BootP Request Mode	BootP Disabled
	In-Band Stack IP Address	0.0.0.0 (no IP address assigned)
	In-Band Switch IP Address	0.0.0.0 (no IP address assigned)
	In-Band Subnet Mask	0.0.0.0 (no subnet mask assigned)
	Default Gateway	0.0.0.0 (no IP address assigned)
SNMP Configuration (page 3-12)	Read-Only Community String	public
	Read-Write Community String	private
	Trap IP Address	0.0.0.0 (no IP address assigned)
	Community String	Zero-length string
	Authentication Trap	Enabled
	Link Up/Down Trap	Enabled
System Characteristics (page 3-14)	Reset Count	1
	Last Reset Type	Power Cycle
	Power Status	Primary Power
	sysContact	Zero-length string

(continued)

Table 5-1. Factory Default Settings for the BayStack 410-24T Switch *(continued)*

Appears in this CI screen	Field	Default setting
	sysName	Zero-length string
	sysLocation	Zero-length string
MAC Address Table (page 3-19)	Aging Time	300 seconds
	Find an Address	00-00-00-00-00-00 (no MAC address assigned)
	Port Mirroring Address A:	00-00-00-00-00-00 (no MAC address assigned)
	Port Mirroring Address B:	00-00-00-00-00-00 (no MAC address assigned)
VLAN Configuration (page 3-24)	Create VLAN	1
	Delete VLAN	blank field
	VLAN Name	VLAN # (*VLAN number*)
	Port Membership	U (all ports assigned as untagged members of VLAN 1)
VLAN Port Configuration (page 3-30)	Unit	1
	Port	1
	Filter Tagged Frames	No
	Filter Untagged Frames	No
	Filter Unregistered Frames	No
	Port Name	Unit 1, Port 1
	PVID	1
	Port Priority	0
VLAN Display by Port (page 3-33)	Unit	1
	Port	1
	PVID	1 (read only)
	Port Name	Unit 1, Port 1 (read only)
Traffic Class Configuration (page 3-34)	Traffic Class	Low
Port Configuration (page 3-36)	Unit	1
	Status	Enabled (for all ports)

(continued)

Table 5-1. Factory Default Settings for the BayStack 410-24T Switch *(continued)*

Appears in this CI screen	Field	Default setting
	Autonegotiation	Enabled (for all ports)
	Speed/Duplex	100Mbs/Half (when Autonegotiation is Disabled)
MultiLink Trunk Configuration (page 3-41)	Trunk Members (Unit/Port)	Zero-length string
	STP Learning	Normal
	Trunk Mode	Basic
	Trunk Status	Enabled
	Trunk Name	Trunk #1 to Trunk #6
MultiLink Trunk Utilization (page 3-45)	Traffic Type	Rx and Tx
Port Mirroring Configuration (page 3-48)	Monitoring Mode	Disabled
	Monitor/Unit Port	Zero-length string
	Unit/Port X	Zero-length string
	Unit/Port Y	Zero-length string
	Address A	00-00-00-00-00-00 (no MAC address assigned)
	Address B	00-00-00-00-00-00 (no MAC address assigned)
Rate Limiting Configuration (page 3-52)	Packet Type	Both
	Limit	None
IGMP Configuration Menu (page 3-55)	VLAN	1
	Snooping	Enabled
	Proxy	Enabled
	Robust Value	2
	Query Time	125 seconds
	Set Router Ports	Version 1
	Static Router Ports	- (for all ports)
Port Statistics (page 3-61)	Unit	1
	Port	1

(continued)

Table 5-1. Factory Default Settings for the BayStack 410-24T Switch *(continued)*

Appears in this CI screen	Field	Default setting
Console/Comm Port Configuration (page 3-65)	Console Port Speed	9600 Baud
	Console Switch Password Type	None
	Console Stack Password Type	None
	TELNET Switch Password Type	None
	TELNET Stack Password Type	None
	Console Read-Only Switch Password	user
	Console Read-Write Switch Password	secure
	Console Read-Only Stack Password	user
	Console Read-Write Stack Password	secure
	Primary RADIUS Server	0.0.0.0
	Secondary RADIUS Server	0.0.0.0
	RADIUS UDP Port	1645
	RADIUS Shared Secret	Blank field
Renumber Stack Units (page 3-72)	New Unit Number	Current stack order
(Only appears when the switch is a participant in a stack configuration.)	Renumber units with new setting?	No
Spanning Tree Port Configuration (page 3-76)	Unit	1
	Participation	Normal Learning
	Priority	128
	Path Cost	10 or 100
Spanning Tree Switch Settings (page 3-79)	Bridge Priority	8000 (read only)
	Designated Root	8000 (bridge_id) (read only)
	Root Port	0 (read only)
	Root Path Cost	0 (read only)

(continued)

Table 5-1. Factory Default Settings for the BayStack 410-24T Switch *(continued)*

Appears in this CI screen	Field	Default setting
	Hello Time	2 seconds (read only)
	Maximum Age Time	20 seconds (read only)
	Forward Delay	15 seconds (read only)
	Bridge Hello Time	2 seconds (read only)
	Bridge Maximum Age Time	20 seconds (read only)
	Bridge Forward Delay	15 seconds (read only)
TELNET Configuration (page 3-82)	TELNET Access	Enabled
	Login Timeout	1 minute
	Login Retries	3
	Inactivity Timeout	15 minutes
	Event Logging	All
	Allowed Source IP Address (10 user-configurable fields)	First field: 0.0.0.0 (no IP address assigned)
		Remaining nine fields: 255.255.255.255 (any address is allowed)
	Allowed Source Mask (10 user-configurable fields)	First field: 0.0.0.0 (no IP address assigned)
	(For details about this field, see Table 3-31 on page 3-83.)	Remaining nine fields: 255.255.255.255 (any address is allowed)
Software Download (page 3-85)	Image Filename	Zero-length string
	TFTP Server IP Address	0.0.0.0 (no IP address assigned)
	Start TFTP Load of New Image	No
Configuration File (page 3-89)	Configuration Image Filename	Zero-length string
	TFTP Server IP Address	0.0.0.0 (no IP address assigned)
	Copy Configuration Image to Server	No
	Retrieve Configuration Image from Server	No

Chapter 5
Sample BootP Configuration File

This appendix provides a sample BootP configuration file. The BootP server searches for this file, called bootptab (or BOOTPTAB.TXT, depending on your operating system), which contains the site-specific information (including IP addresses) needed to perform the software download and configuration. You can modify this sample BootP configuration file or create one of your own.

A sample BootP configuration file follows:

```
# The following is a sample of a BootP configuration file that was extracted
# from a Bay Networks EZ LAN network management application.  Note that other
# BootP daemons can use a configuration file with a different format.
#
# Before using your switch BootP facility, you must customize your BootP
# configuration file with the appropriate data.
#
# Blank lines and lines beginning with '#' are ignored.
#
# Legend:
#
#       first field -- hostname
#                ht -- hardware type
#                ha -- host hardware address
#                tc -- template host (points to similar host entry)
#                ip -- host IP address
#                hd -- bootfile home directory
#                bf -- bootfile
# EZ             dt -- device type
# EZ             fv -- firmware version
# EZ             av -- agent version
#
# Fields are separated with a pipe (|) symbol. Forward slashes (/) are
# required to indicate that an entry is continued to the next line.
#
```

```
# Caution
#
#     Omitting a Forward slash (/) when the entry is continued to the next
#     line, can cause the interruption of the booting process or the
#     incorrect image file to download.  Always include forward slashes
#     where needed.
#
# Important Note:
#
#     If a leading zero (0) is used in the IP address it is calculated as an
#     octal number.  If the leading character is "x" (upper or lower case),
#     it is calculated as a hexadecimal number. For example, if an IP address
#     with a base 10 number of 45 is written as .045 in the BOOTPTAB.TXT file,
#     the Bootp protocol assigns .037 to the client.
#
# Global entries are defined that specify the parameters used by every device.
# Note that hardware type (ht) is specified first in the global entry.
#
# The following global entry is defined for an Ethernet device. Note that this
# is where a client's subnet mask (sm) and default gateway (gw) are defined.
#
global1|/
      |ht=ethernet|/
      |hd=c:\opt\images|/
      |sm=255.255.255.0|/
      |gw=192.0.1.0|
#
# The following sample entry describes a BootP client:

bay1|ht=ethernet|ha=0060fd000000|ip=192.0.0.1|hd=c:\ezlan\images|bf=b410_100.img

# Where:
#    host name:                    bay1
#    hardware type:                Ethernet
#    MAC address:                  00-60-FD-00-00-00
#    IP address:                   192.0.0.1
#    home directory of boot file:  c:\ezlan\images
#    boot file:                    b410_100.img
```

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